

REDACTED COPY
CONFIDENTIAL TREATMENT REQUESTED

October 31, 2012

VIA ELECTRONIC SUBMISSION

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Progeny LMS, LLC & Itron, Inc.
Request for Confidential Treatment
Part 15 Joint Test Report
WT Docket No. 11-49

Dear Ms. Dortch:

Progeny LMS, LLC (“Progeny”) and Itron, Inc. (“Itron”), each by its counsel and pursuant to Sections 0.457 and 0.459 of the Commission’s Rules, 47 C.F.R. §§ 0.457, 0.459, hereby requests that the redacted portions of the parties’ Part 15 Joint Test Report be treated as confidential and be withheld from public inspection.

Pursuant to Section 90.353(d) of the Commission’s rules¹ and paragraph 29 of the Commission’s *Waiver Order*,² Progeny is required to demonstrate that its Multilateration Location and Monitoring Service (“M-LMS”) network does not cause unacceptable levels of interference to Part 15 devices. On January 27, 2012, Progeny filed with the Commission the results of testing that were conducted in 2011 on behalf of Progeny by an independent third party testing firm, Spectrum Management Consulting Inc. (“SMC”).³

¹ See 47 C.F.R. § 90.353(d).

² See Request by Progeny LMS, LLC for Waiver of Certain Multilateration Location and Monitoring Service Rules, *Order*, DA 11-2036, ¶ 29 (Dec. 20, 2011) (“*Waiver Order*”) (granting conditional waivers of Sections 90.155(e) and 90.353(g) of the Commission’s rules).

³ See *Coexistence of M-LMS Network and Part 15 Devices*, Spectrum Management Consulting Inc. (Jan. 27, 2012) (“*Part 15 Field Test Report*”) (included as an attachment to *Letter from Bruce A. Olcott, Counsel to Progeny LMS, LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission*, WT Docket No. 11-49 (Jan. 27, 2012) (“*Progeny Part 15 Field Test Report Filing*”).

At the request of the Commission, Progeny subsequently agreed to additional testing on a joint basis with three entities: Itron; Landis+Gyr Company (“Landis+Gyr”); and the Wireless Internet Service Providers Association (“WISPA”). The attached report addresses the tests that were conducted with Itron. The report includes details about the equipment employed in the tests, its capabilities, and its performance, matters the parties believe are commercial trade secrets. Progeny and Itron jointly request confidential treatment for the redacted portions of the attached report. In support of this request, and in accordance with the requirements of Section 0.459(b) of the Commission’s rules, 47 C.F.R. § 0.459(b), Progeny and Itron submit the following:

0.459(b)(1): Progeny and Itron seek confidential treatment for certain portions of the attached Part 15 Joint Test Report, primarily the distances between the Itron ERT and CCU devices tested, the distances between the Itron devices and the Progeny beacons (as well as the test location configuration maps which indicate this information), the latitude and longitude of the set-up of the Itron equipment, the FCC equipment identification numbers and Itron commercial names of the devices tested, the dBm levels of the PER testing, and the raw test results data (*i.e.* the attached spreadsheets).

0.459(b)(2): Progeny and Itron are filing this Part 15 Joint Test Report in WT Docket Number 11-49 at the request of the Commission staff and in furtherance of the requirement that Progeny must demonstrate that its M-LMS network does not cause unacceptable levels of interference to Part 15 devices.

0.459(b)(3): Progeny and Itron’s Part 15 Joint Test Report contains highly sensitive, confidential, and proprietary commercial and technical information, including trade secrets regarding the design and operation of Itron’s automatic meter reading (“AMR”) devices. The Part 15 Joint Test Report contains test results, including raw data from the tests, which provide further detail regarding the functioning and capabilities of Itron’s AMR equipment, including the technical designs and operational methods that Itron employs to enable its AMR devices to operate successfully in the 902-928 MHz band. Itron treats such information as highly confidential and does not disclose it to third parties absent a Nondisclosure Agreement (“NDA”). In fact, Itron required Progeny to enter into an NDA prior to gaining access to the technology and information. As such, the redacted information in the Part 15 Joint Test Report qualifies as material that “would customarily be guarded from competitors” within the meaning of Section 0.457(d)(2) of the Commission’s rules. In addition, the Part 15 Joint Test Report would be protected from disclosure under the Freedom of Information Act (“FOIA”) as “trade secrets and commercial or financial information obtained from a person and privileged or confidential.” 5 U.S.C.A. § 552(b)(4).

0.459(b)(4): The redacted portions of the attached Part 15 Joint Test Report contain trade secrets and confidential information regarding the design and operation of Itron’s AMR networks and devices. The market for AMR equipment is highly competitive and Itron must

protect its trade secrets in order to remain competitive with other providers of AMR equipment and services.

0.459(b)(5): Disclosure of the confidential information could compromise the ability of Itron to compete successfully with other providers of AMR equipment and services in this highly competitive industry. As a result, the release of any portion of this information could compromise Itron's competitive edge in the AMR equipment industry, resulting in substantial competitive harm to Itron.

0.459(b)(6): Itron does not permit the dissemination of its confidential trade secrets and proprietary information regarding its AMR equipment and methodologies to non-employees without the execution of a confidentiality agreement. Furthermore, all such confidentiality agreements require third party recipients of the information to request confidential treatment of the information as a part of any submission of any portion of the information to government agencies, such as the Commission. The NDA that Itron required Progeny to enter into included such a provision.

0.459(b)(7): The information contained in the attached Part 15 Joint Test Report is not available to the public and, to the best of the knowledge of Progeny and Itron, has not been disseminated to non-Progeny or non-Itron personnel without the execution of a confidentiality agreement.

0.459(b)(8): Progeny and Itron request that the Commission permanently withhold the information contained in the attached Part 15 Joint Test Report. Release of this information at any time in the future would cause substantial competitive harm to Itron.

For the foregoing reasons, Progeny and Itron respectfully request that the redacted portions of the Part 15 Joint Test Report be granted confidential status and be withheld from public inspection. If confidential treatment is not granted for these redacted portions of the attached Part 15 Joint Test Report, Progeny and Itron request that all copies of the Part 15 Joint Test Report be returned to Progeny and Itron.

Please let us know if you have any questions.

Respectfully Submitted,

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Joint Itron – Progeny Testing

July 23 – August 1, 2012

10/26/2012

JOINT ITRON-PROGENY TESTING

JULY 23 - AUGUST 1

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Introduction:

Personnel from both Itron and Progeny participated in a joint testing program between the above noted dates in the San Jose – Santa Clara area of California to document the effect, if any, of the Progeny M-LMS network on Itron automated meter reading (AMR) equipment. Consistent with the general outlines of the test plans, the groups performed system level test of one family of Itron equipment in multiple equipment configurations, at multiple receiver heights in multiple locations and network environments. In addition to system level tests using production equipment configured for this specific testing, the group utilized spectrum analyzers, packet generators and other test equipment to characterize the RF environment by individual channels and power levels at each test location.

Results for all the July/August testing are included in this document. The main body of the report includes descriptions of the test environments as well as the primary data tables, charts, graphs and spectrum plots. In instances where charts or graphs included only representative data (such as power levels and frequencies), the underlying data for all power levels and frequencies are included in embedded Excel spreadsheets. The Appendix contains information on equipment types and serial numbers, frequency mapping to channels information, and preliminary test data. This document describes the test environments and catalogs the joint test results that were obtained. This document does not assess the data obtained, draw any conclusions or make any recommendations from the data.

Equipment types and configurations tested:

Three principal equipment configurations were tested at each location.

The first configuration (see diagram 1) involved an Itron receiver/(Cell Control Unit – CCU) on a mast receiving transmissions from multiple End Points (Encoder Receiver Transmitters – ERTs). The ERTs were grouped together in a car at locations approximately [REDACTED] from the receiver CCU. Itron indicates that in a normal operational systems, there would be thousands of ERTs at varying distances up to several miles around a CCU or repeater (given sufficient CCU or repeater height), which was not possible to test with the only fully deployed Progeny system in San Jose/Santa Clara County. The receiver/CCU mast was positioned at three different heights during the test, at 50 feet, 25 feet and 11 feet.

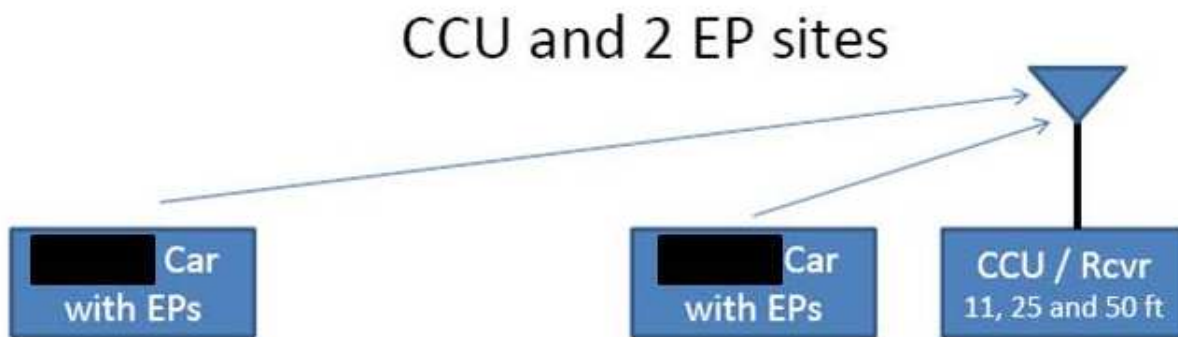


Diagram 1

Although the test was stationary not the normal 30mph drive by, the 11 foot position is representative of a “mobile receiver” which is van mounted and drives a route to collect input from ERTs. The 25 foot position is representative of a standard “pole mounted” receiver which represents one of the fixed network configurations. The 50 foot position is representative of fixed installations (water towers, communications towers, building, etc.), when pole attachments are not available

The [REDACTED] ERT group is representative of moderate distance ERT placements around a CCU, while the [REDACTED] ERT group is representative of further out ERT placements (although ERT’s can be placed even further out in Itron deployments, depending on specific installation needs, as mentioned above).

A combination of multiple ERT equipment types was grouped together to aid in this testing and tested simultaneously [REDACTED], with multiple numbers of each type all transmitting during each test configuration.

The second configuration (see diagram 2) did not involve 11 foot mast heights and represents a more typical fixed network installation. This configuration includes the receiver CCU (at 50 foot and 25 foot heights) receiving data from nearby ERTs as well as communicating with a receiver/repeater (at 25 foot height) which is also receiving data from one family of [REDACTED] ERTs (including those located between the repeater and receiver CCU) as well as more remote ERTs. The Repeater [REDACTED] repeats Itron endpoint data packet with a receiving radio identical to the CCU, but retransmits the packets on different channels to a CCU. The Repeater [REDACTED] was using a 50 Channel plan with 25 channels in the lower portion of the 902 - 928MHz band and 25 channels on the upper portion of the 902 - 928MHz band. In each test, the repeater was placed between [REDACTED] from the receiver CCU (sufficient to achieve a stable data link), and one group of ERTs was placed between the two locations with an additional group of ERTs beyond the repeater location [REDACTED]. As in the prior CCU/ERT test, a combination of multiple ERT equipment types was tested simultaneously with multiple numbers of each type transmitting during each test configuration.

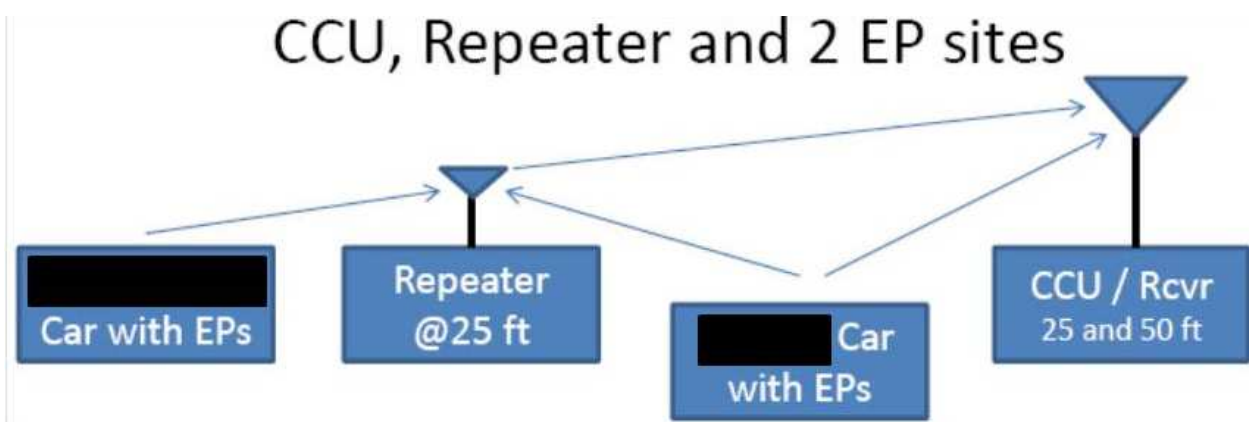


Diagram 2

Simultaneous with Configuration 1 and immediately after Configuration 2 System Test, a Radio Frequency/Packet Error Rate (RF/PER) test (see diagram 3) was run for the purpose of characterizing

the RF environment at each test location, measured across the 902 - 928 MHz band (measured in 200 KHz increments), at power levels between [REDACTED] (measured in [REDACTED] increments). During this testing a Itron standard network interval packet identical to the packet transmitted by [REDACTED] endpoints was injected into a sampling port of an isolation-T [REDACTED]. The isolation T is first referenced to a 50 ohm load and then connected to an antenna which is opened to the external RF environment. A Standard Itron Cell Control Unit (CCU) radio decodes the packets and reports the packets to an external computer which computes the reliability of the decoded packets [REDACTED]. In charts of RF/PER data shown in this document, only a single power level was chosen at each location to represent the results, but the underlying data for all power levels is contained in the attached Excel spreadsheets.

Generally the RF/PER test setup time was 10 minutes and the RF/PER test run was 20 - 25 minutes per receiver height both with Progeny M-LMS beacon network on and again with the beacon network off. RF/PER Testing is a standard test that Itron conducts at proposed sites to characterize the RF environment and utilizes the results to model Itron system performance prior to a full system deployment.

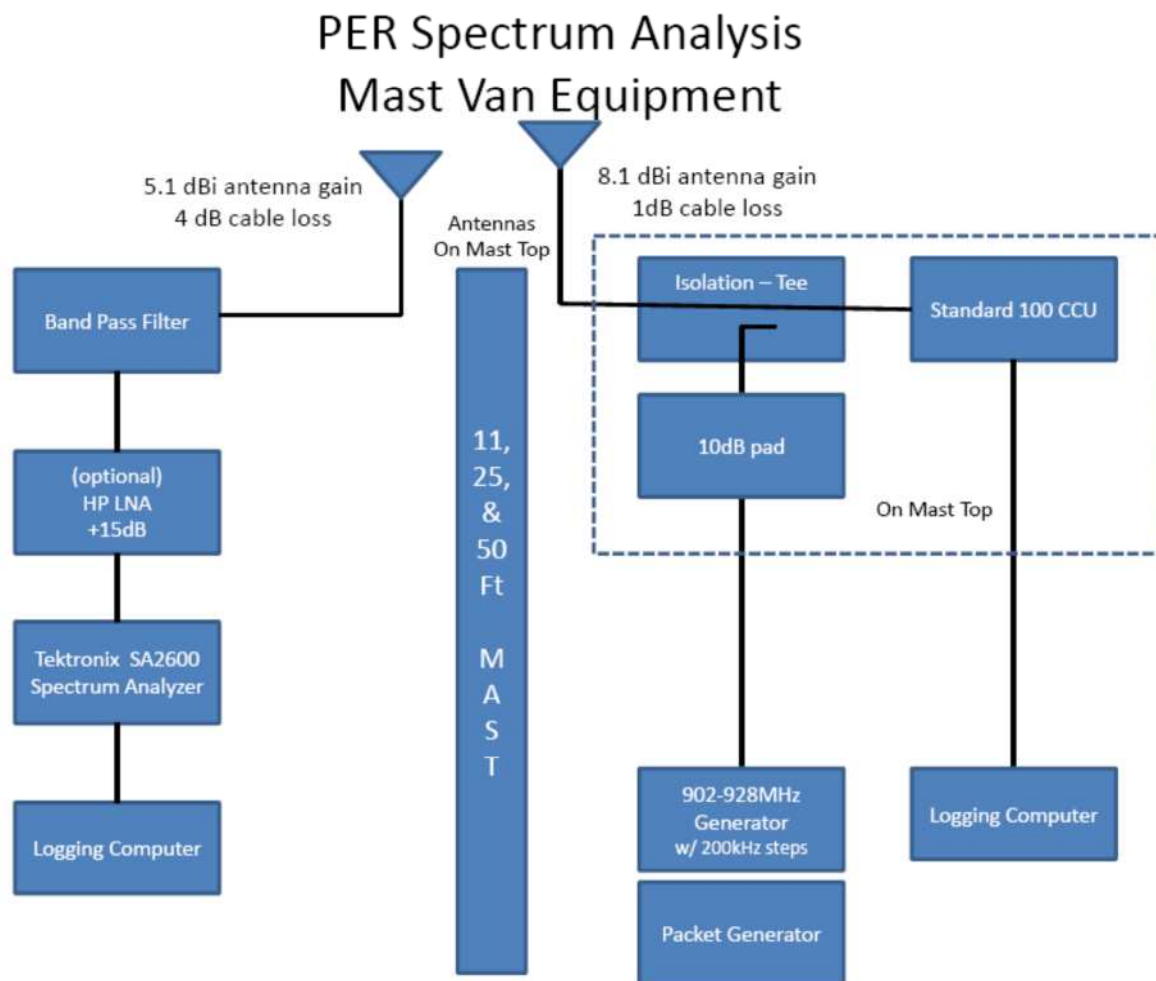


Diagram 3

Equipment channel and transmission frequency settings:

In the CCU/ERT equipment configuration, the ERTs were programmed to use 100 channels across their operating range, including channels that were co-channel with the Progeny M-LMS beacon carriers. Depending on the ERT equipment type, the units were programmed to transmit data on intervals of 10 seconds or 30 seconds (rather than the normal 5 minute or longer intervals). These compressed transmission intervals, combined with several ERTs transmitting throughout the test period, allowed for collection of data on transmitted packets (ranging from 700 to 3000 offered packets on a system basis, or 7-30 offered packets on an individual channel basis). For PER testing there were 71 offered packets per individual channel.

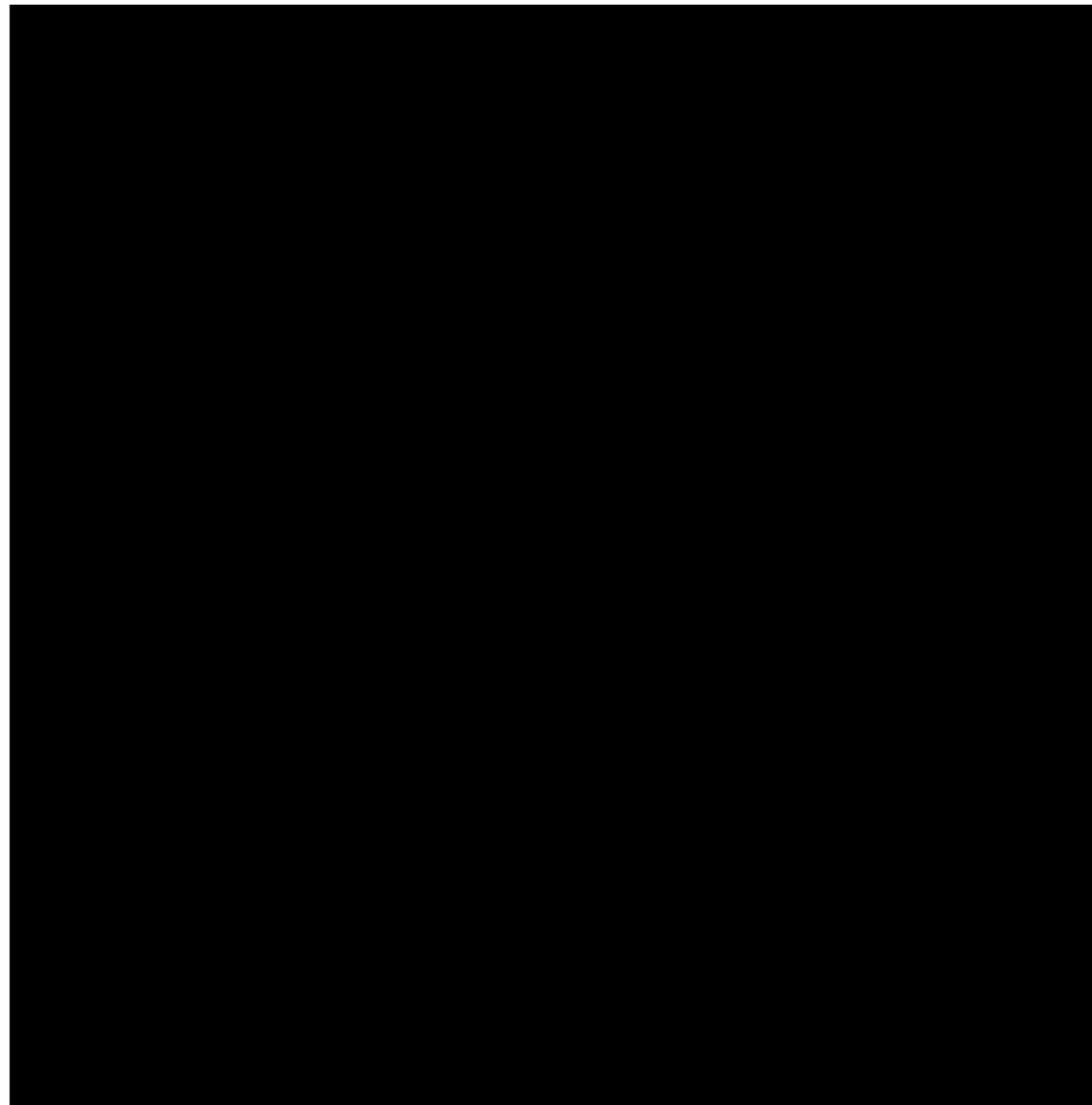
On average, each test scenario for configuration 1 and PER testing remained active for 27 minutes (the time required to complete an entire RF characterization sweep by channel and power level), and the tests in configuration 2 ran 90 minutes. The test processes for configuration 1 and 2 were performed with RF/PER characterization testing.

Test Locations:

Tests were performed at three locations chosen to represent different network environments. The locations were:

Location 1: Suburban (close proximity, but no colocation)

The receiver CCU in this location was in a suburban parking lot in Santa Clara chosen to be equal distant (from a standpoint of power levels) from three Progeny M-LMS beacons. The Progeny beacon closest to the CCU was [REDACTED] away, with then next closest beacons [REDACTED] away. A Progeny receiver (at ground level) verified reception of a mean total of 15 M-LMS beacons. In Configuration 1, the ERTs were located [REDACTED] from the CCU. In configuration 2, the ERTs were located [REDACTED] from the CCU and [REDACTED] from the Repeater. The repeater was located 0.47 miles from the CCU.



Location 1 Configuration 2: Lawrence Expressway at Lake Haven

Location 2: Suburban (no close proximity and no collocation)

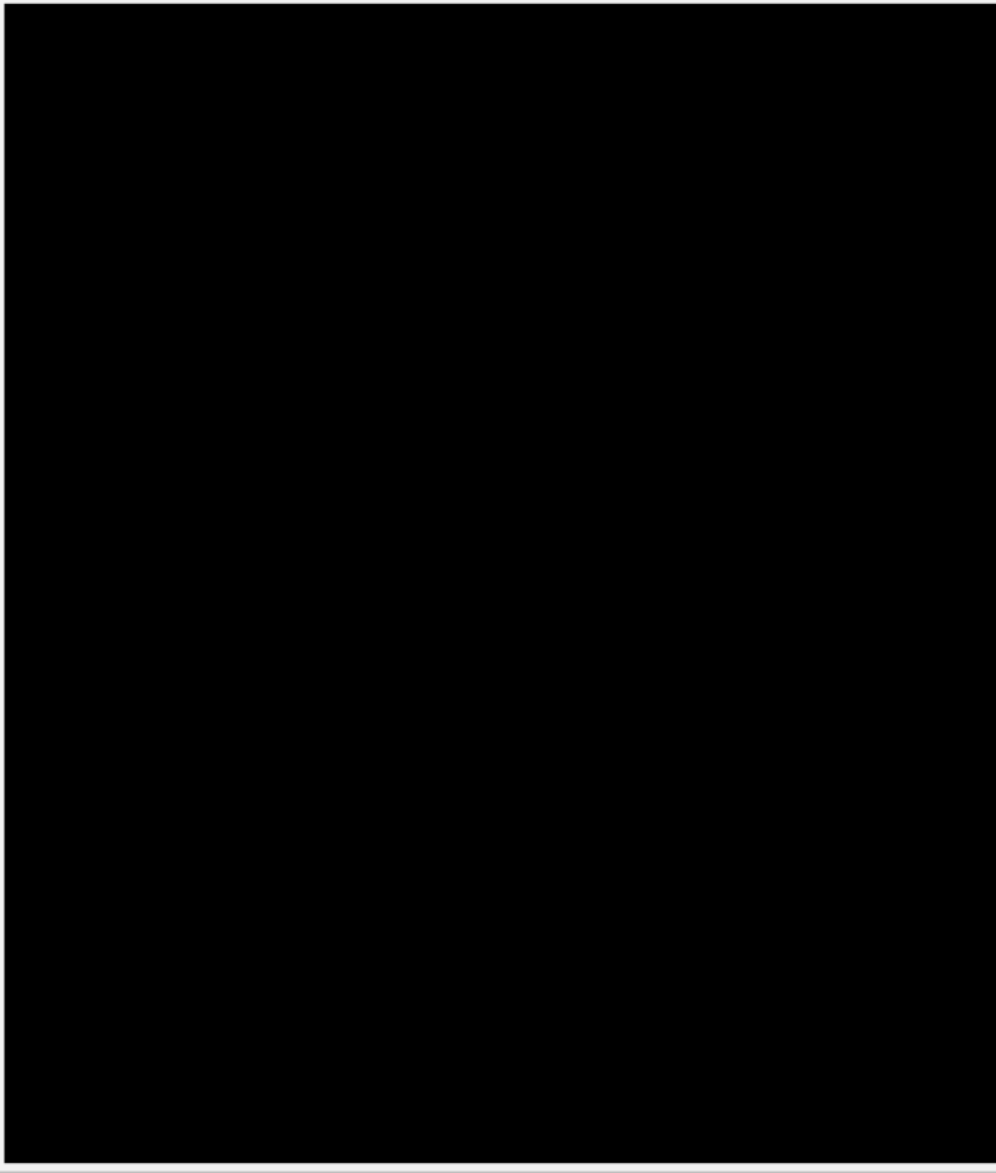
The receiver in this location was in a suburban parking lot in South San Jose with no Progeny M-LMS beacons in close proximity. The Progeny beacon closest to the CCU was [REDACTED] the next two were [REDACTED] away. A Progeny receiver (at ground level) verified the reception of a total of 11 M-LMS beacons. In Configuration 1, the ERTs were located [REDACTED] from the CCU. In configuration 2, the ERTs were located [REDACTED] from the CCU and [REDACTED] from the Repeater. The repeater was located 1.18 miles from the CCU.



Location 2 Configuration 2: Residence Inn, South San Jose

Location 3: Urban (colocation and close proximity)

The receiver CCU in this location was in a parking lot in downtown San Jose directly adjacent to one Progeny M-LMS beacon with three additional M-LMS beacons at [REDACTED] from the CCU receiver. A Progeny receiver (at ground level) verified reception of a total of 13 M-LMS beacons. In Configuration 1, the ERTs were located [REDACTED] from the CCU. In configuration 2, the ERTs were located [REDACTED] from the CCU and [REDACTED] from the Repeater. The repeater was located 1.09 miles from the CCU.



Location 3 Configuration 2: Near 575 E Santa Clara St.

Test Data Documentation:

In each of the test configurations, both parties participated in establishing the test set up, documenting the equipment identifications and locations, and monitoring the test instruments and equipment. Itron was responsible for collection and tabulation of the raw data results, which were then annotated with the appropriate test case information and shared with Progeny. Test templates (see Table 5 below) were created to denote which test configurations were completed and which test case number was assigned to each set of test results.

Table 5: Test cases and File Numbers

Location 1 = Equal distance from 3 beacons

Suburban 80 yds North of Shell Station at Lawrence and Lake Haven

Equipment Configuration 1 = Receiver + Multiple End Points

File Name			
	CCU Mast Height	Net ON	Net OFF
100 Channels	11 ft	Test 36	Test 35
	25 ft	Test 37	Test 33
	50 ft	Test 38	Test 34

Equipment Configuration 2 = 100 Channel Repeater (25 ft), CCU Receiver, Multiple End Points

File Name			
	CCU Mast Height	Net ON	Net OFF
100 Channels	25 ft	Test 40	Test 41
	50 ft	Test 39	Test 42

Network Characterization Test (Run at same time as System Test - Equipment Type 1)

File Name			
	Mast Height	Net ON	Net OFF
All Channels	11 ft	Test 36	Test 35
	25 ft	Test 37	Test 33
	50 ft	Test 38	Test 34

Location 2: Typical Suburban Residence Inn South San Jose

Equipment Configuration 1 = Receiver + Multiple End Points

File Name			
	CCU Mast Height	Net ON	Net OFF
100 Channels	11 ft	Test 21	Test 22
	25 ft	Test 20	TEST 16
	50 ft	TEST 18	TEST 17

Equipment Configuration 2 = 100 Channel Repeater (25 ft), CCU Receiver, Multiple End Points

File Name			
	CCU Mast Height	Net ON	Net OFF
100 Channels	25 ft	Test 47	Test 50
	50 ft	Test 48	Test 49

Network Characterization Test (Run at same time as System Test - Equipment Type 1)

		File Name	
	Mast Height	Net ON	Net OFF
All Channels	11 ft	TEST 21	TEST 22
	25 ft	TEST 20	TEST 16
	50 ft	TEST 18	TEST 17

Location 3: Adjacent/Colocation and Urban Equidistance - intersection of E Santa Clara and N13th St

Equipment Configuration 1 = Receiver + Multiple End Points

File Name			
	CCU Mast He	Net ON	Net OFF
100 Channels	11 ft	Test 25	Test 26
	25 ft	Test 24	Test 27
	50 ft	Test 23	Test 28

Equipment Configuration 2 = 100 Channel Repeater (25 ft), CCU Receiver, Multiple End Points

File Name			
	CCU Mast He	Net ON	Net OFF
100 Channels	11 ft	NA	NA
	25 ft	Test 45	Test 44
	50 ft	Test 46	Test 43

Network Characterization Test (Run at same time as System Test - Equipment Type 1)

File Name			
	Mast Height	Net ON	Net OFF
All Channels	11 ft	Test 25	Test 26
	25 ft	Test 24	Test 27
	50 ft	Test 23	Test 28

Test Results:

The following section contains the formatted raw data resulting from the multiple test configurations described in this document as well as spectrum plots for with the Progeny system off and on. The tables and graphs show the performance of the system based upon 2 ERT groups spaced at the distances noted. By noting the expected packets sent, versus the packets received, Packet Success Rate can be calculated based upon the difference between these two numbers. The results in the following tables always refer to the packet success rate (PSR) of the system and the graphs show the raw data on an individual channel basis across the spectrum.

Configuration 1: ERT to CCU Tests

Location 1: Suburban (close proximity, but no colocation)



Distances to the 3 closest beacons are: [REDACTED]

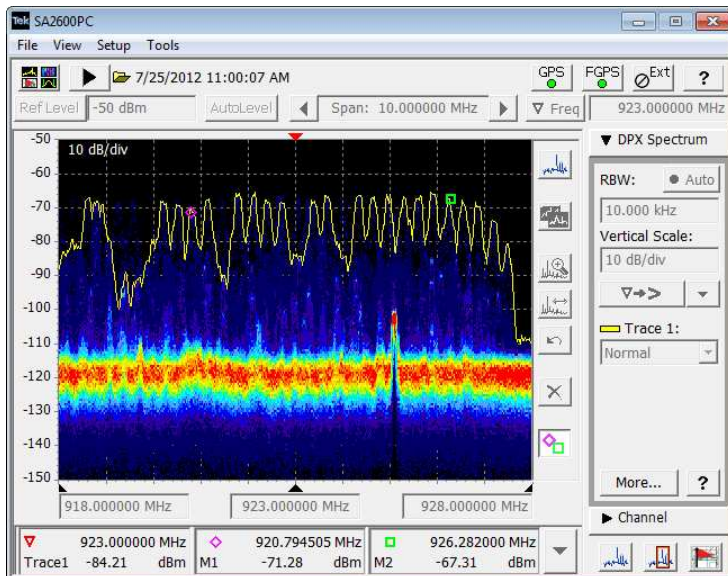
System Test: ERT to CCU Results Location 1 100 Channels

			[REDACTED] ERT Group EP Loc 3						[REDACTED] ERT Group EP Loc 4					
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test35	11 ft	OFF	604	726	83.2		8	8	72	882	8.2		7	11
Test36	11 ft	ON	542	729	74.4	8.8	8	8	59	885	6.7	1.5	9	11
Test33	25 ft	OFF	625	728	85.9		8	8	206	883	23.3		11	11
Test37	25 ft	ON	554	721	76.8	9.1	8	8	155	876	17.7	5.6	11	11
Test34	50 ft	OFF	639	728	87.8		8	8	145	883	16.4		10	11
Test38	50 ft	ON	583	722	80.8	7	8	8	120	877	13.7	2.7	11	11

Spectrum Plots and Performance Across Channels

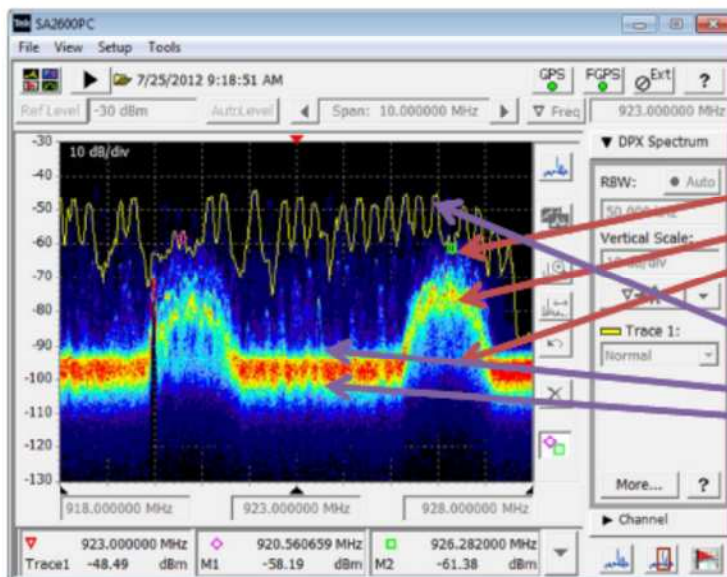
Progeny System Off

Note: Different plots have reference levels. This limited dynamic range of the spectrum analyzer will effect the overall noise floor measurements.



Progeny System On

**Tektronix SA 2600 operating in DSX mode
With Band Pass filter and 15 dB amplifier**



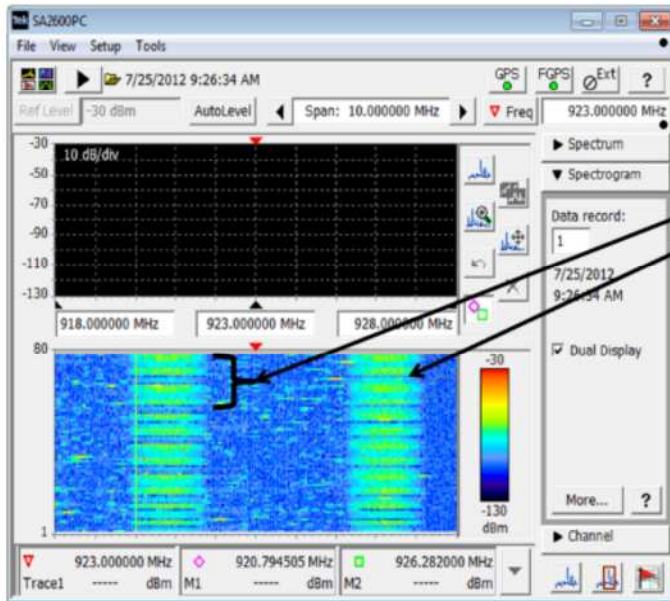
•Progeny

- Peak Power Detected
- Average Power Detected
- Minimum Power Detected

•15.247 High Speed Hopper

- Peak Power Detected
- Average Power Detected
- Minimum Power Detected

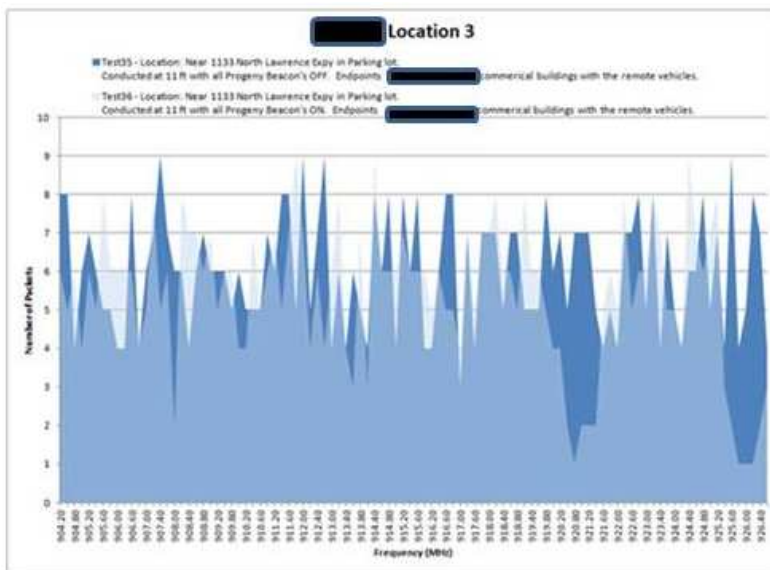
Tektronix SA 2600 operating in DSX /waterfall mode With Band Pass filter and 15 dB amplifier



Progeny System Beacon Timing

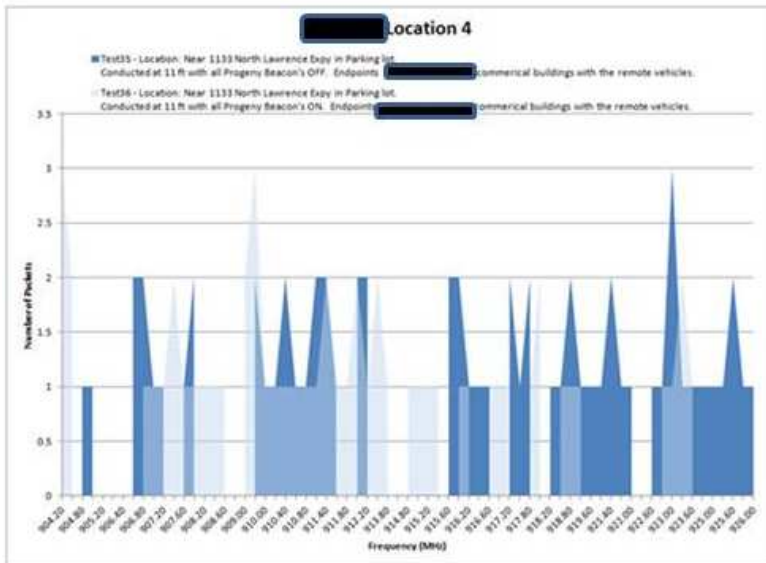
- 100 ms time slots per beacon
- Approximately 2 seconds
- 100 ms time gap

Test 35 and Test 36 (11 ft Antenna Ht.)



RT Group EP Loc 3								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 35	11 ft	OFF	604	726	83.2		8	8
Test 36	11 ft	ON	542	729	74.4	8.8	8	8

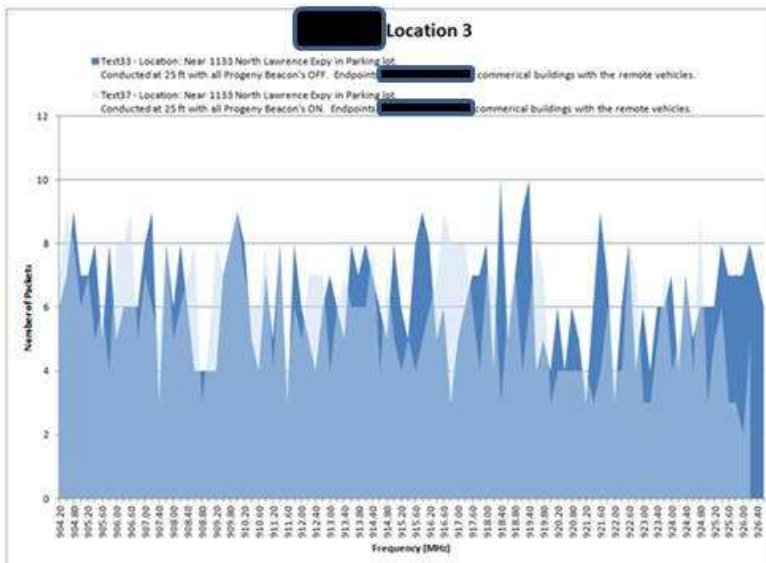
This is the decoded packet count for the endpoints at EP Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 35 with the Progeny system off. The light blue are the endpoint packets decoded from Test 36 with the Progeny system on.



ERT Group EP Loc 4								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 35	11 ft	OFF	72	882	8.2		7	11
Test 36	11 ft	ON	59	885	6.7	1.5	9	11

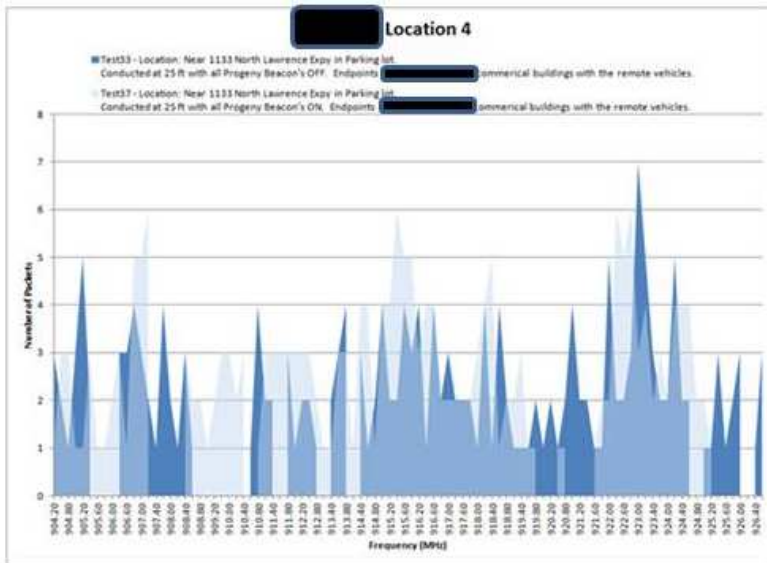
This is the decoded packet count for the endpoints at EP Location 4. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 35 with the Progeny system off. The light blue are the endpoint packets decoded from Test 36 with the Progeny system on.

Test 33 and Test 37 (25 ft. Antenna Ht.)



ERT Group EP Loc 3								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 33	25 ft	OFF	625	728	85.9		8	8
Test 37	25 ft	ON	554	721	76.8	9.1	8	8

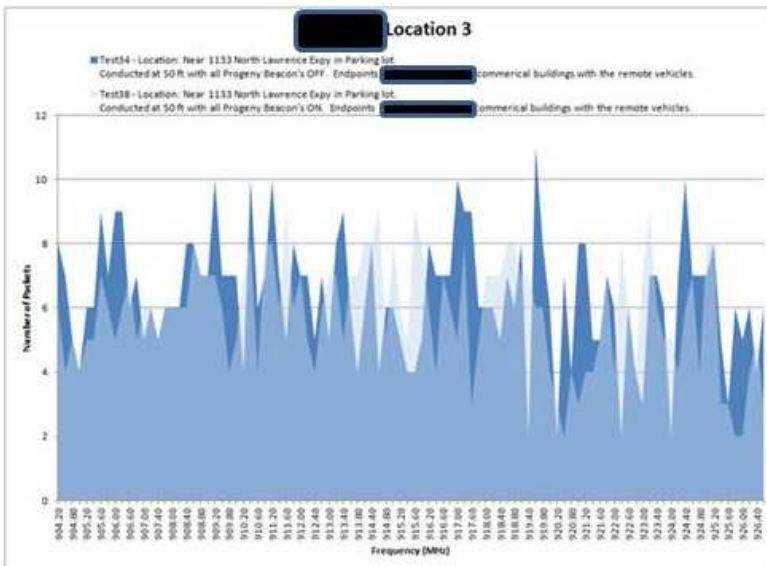
This is the decoded packet count for the endpoints at EP Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 33 with the Progeny system off. The light blue are the endpoint packets decoded from Test 37 with the Progeny system on.



ERT Group EP Loc 4								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 33	25 ft	OFF	206	883	23.3		11	11
Test 37	25 ft	ON	155	876	17.7	5.6	11	11

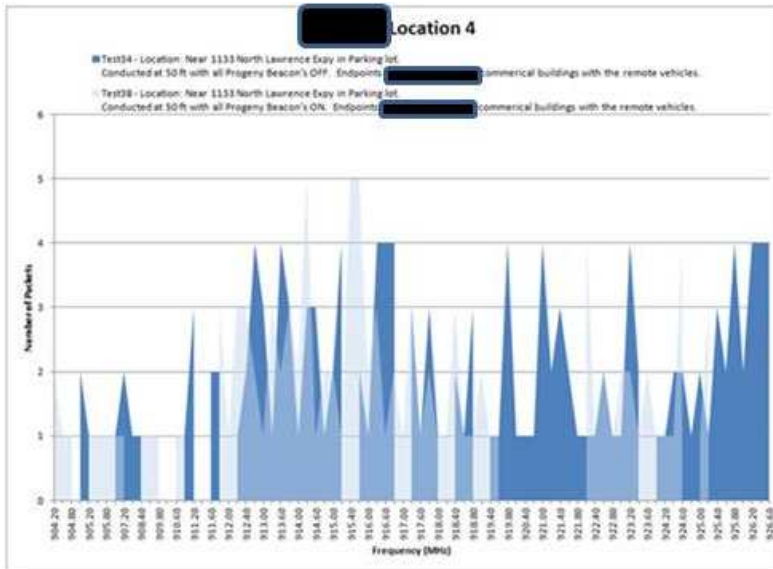
This is the decoded packet count for the endpoints at EP Location 4. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 33 with the Progeny system off. The light blue are the endpoint packets decoded from Test 37 with the Progeny system on.

Test 34 and Test 38 (50 ft. Antenna Ht.)



ERT Group EP Loc 3								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 34	50 ft	OFF	639	728	87.8		8	8
Test 38	50 ft	ON	583	722	80.8	7	8	8

This is the decoded packet count for the endpoints at EP Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 34 with the Progeny system off. The light blue are the endpoint packets decoded from Test 38 with the Progeny system on.

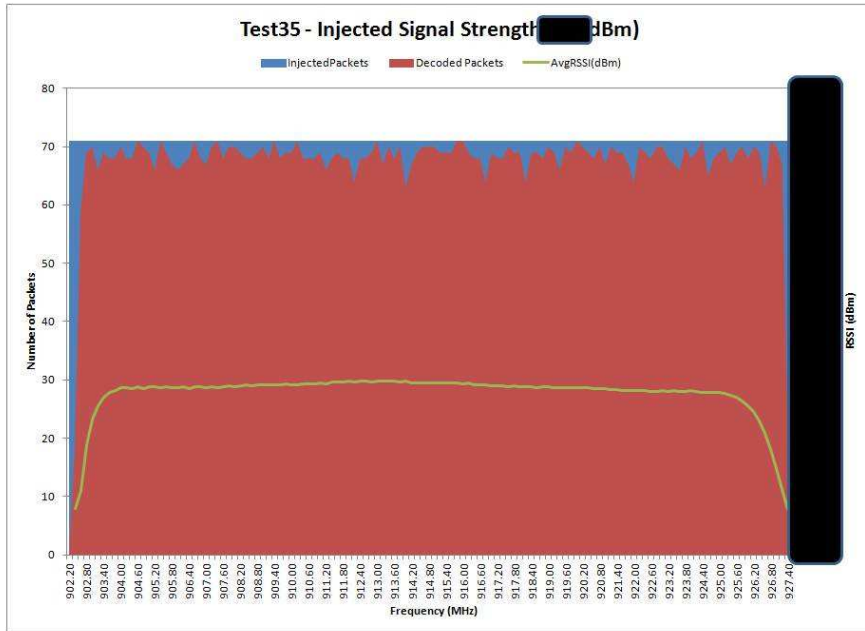


ERT Group EP Loc 4								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 34	50 ft	OFF	145	883	16.4		10	11
Test 38	50 ft	ON	120	877	13.7	2.7	11	11

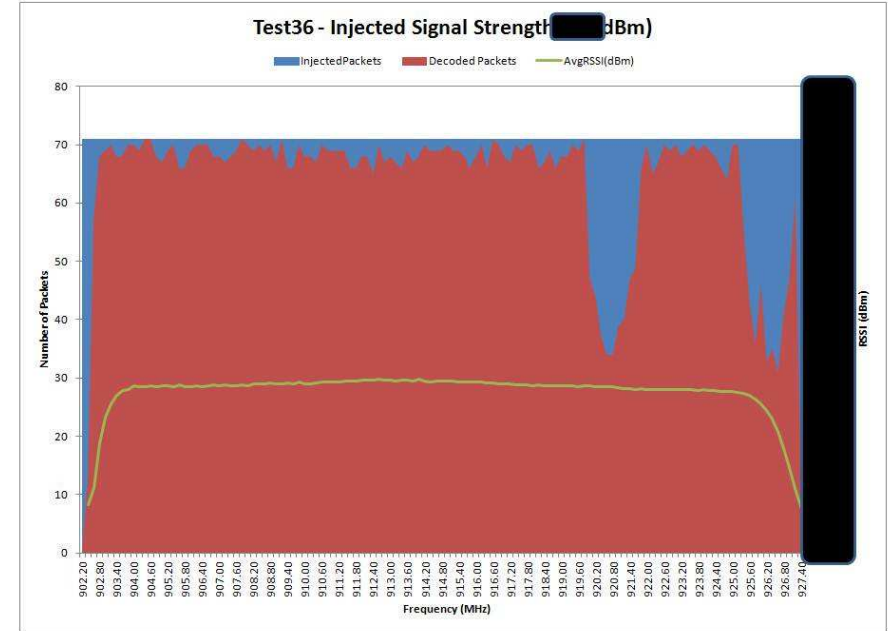
This is the decoded packet count for the endpoints at EP Location 4. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 34 with the Progeny system off. The light blue are the endpoint packets decoded from Test 38 with the Progeny system on.

RF/PER Tests Showing Packet Success Rate

Test 35 and Test 36 (11 ft Antenna Ht.)
Packet Error Test Results

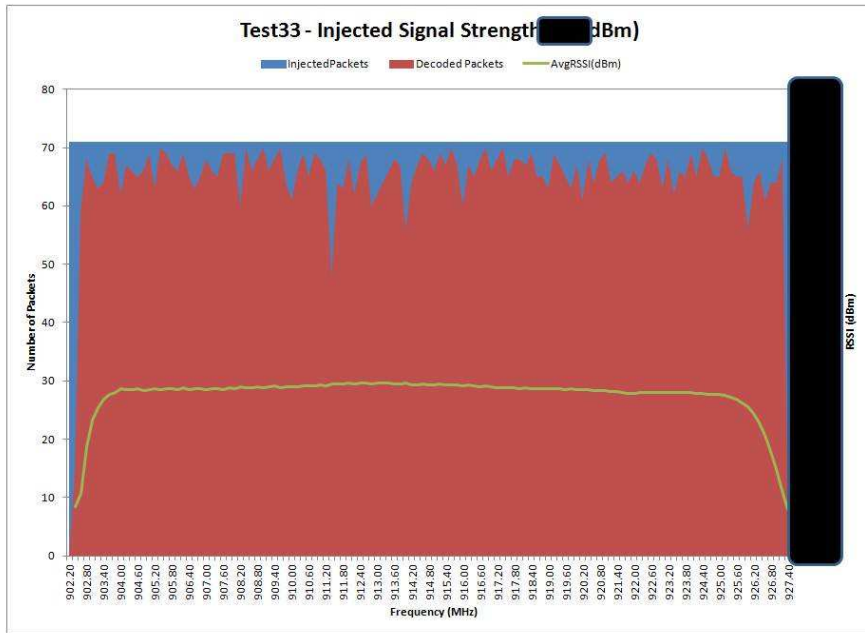


Test 35 with the antenna height at 11 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.

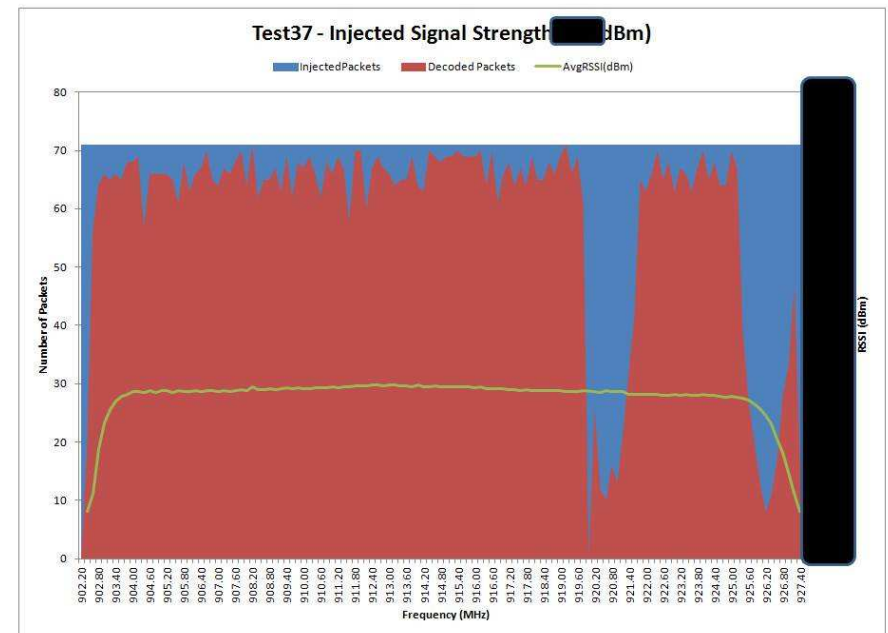


Test 36 with the antenna height at 11 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 33 and Test 37 (25 ft. Antenna Ht.)
 Packet Error Test Results

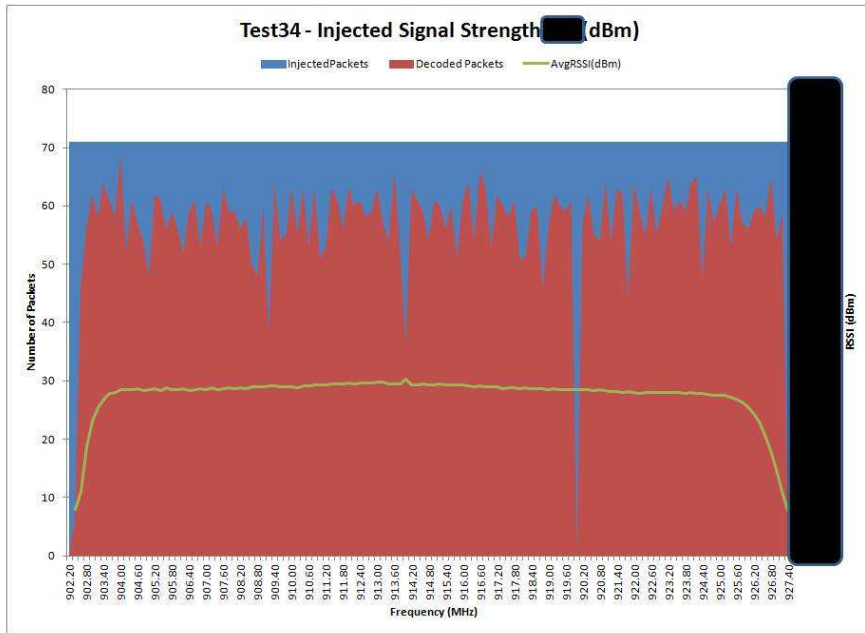


Test 33 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.

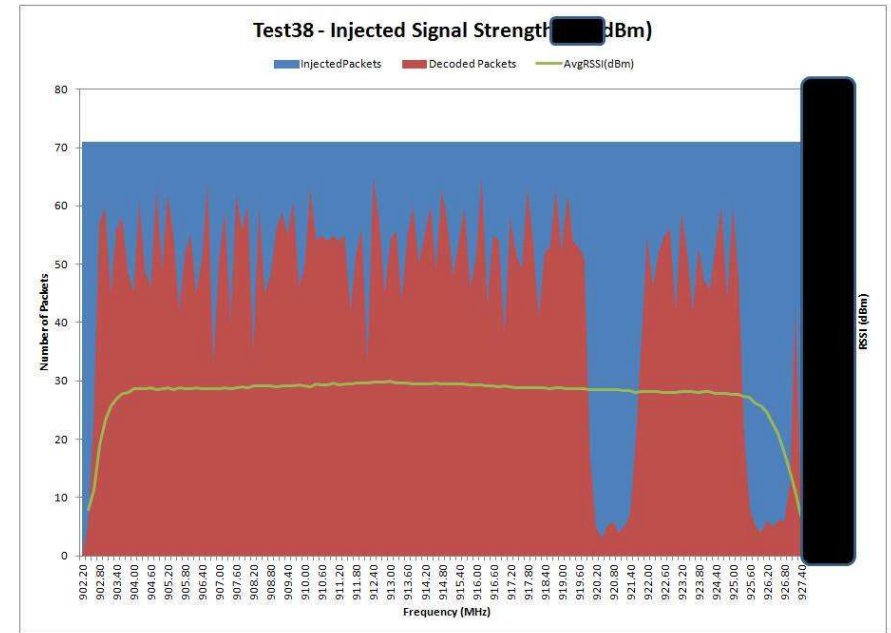


Test 37 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 34 and Test 38 (50 ft. Antenna Ht.)
Packet Error Test Results



Test 34 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



Test 38 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

[Configuration 1 Location 1 Data: In attached spreadsheet - Location1directreads.xlsx](#)

Location 2: Suburban (no close proximity and no colocation)



Distances to the 3 closest beacons are: [REDACTED]

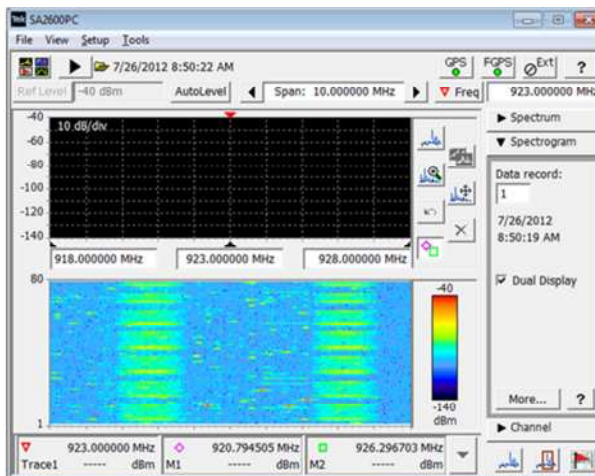
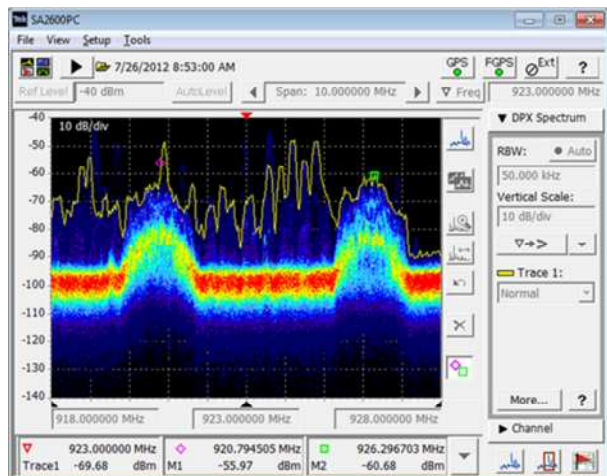
System Test: ERT to CCU Results Location 2 100 Channels

			[REDACTED] ERT Group EP Location 3						[REDACTED] ERT Group EP Location 4					
Test Number	Mast Height	Net OFF/ ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test22	11 ft	OFF	501	726	69		8	8	42	882	4.8		6	11
Test21	11 ft	ON	470	724	64.9	4.1	8	8	52	879	5.9	1.1	8	11
Test16	25 ft	OFF	540	726	74.4		8	8	315	882	35.7		11	11
Test20	25 ft	ON	528	726	78	-4.1	8	8	266	881	30.2	5.5	11	11
Test17	50 ft	OFF	668	728	91.8		8	8	421	883	47.7		11	11
Test18	50 ft	ON	659	727	90.7	1.1	8	8	342	882	38.8	8.9	11	11

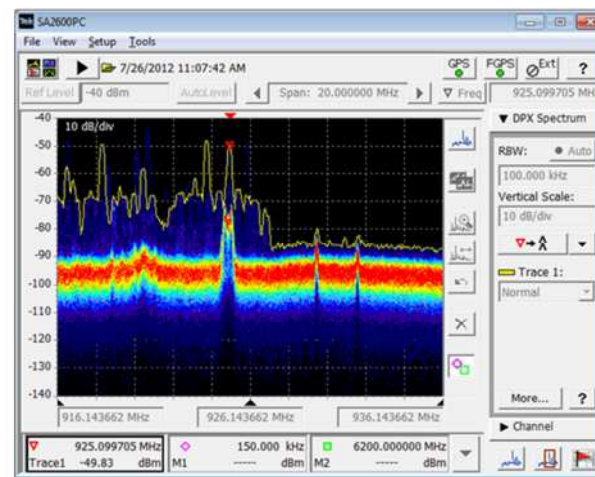
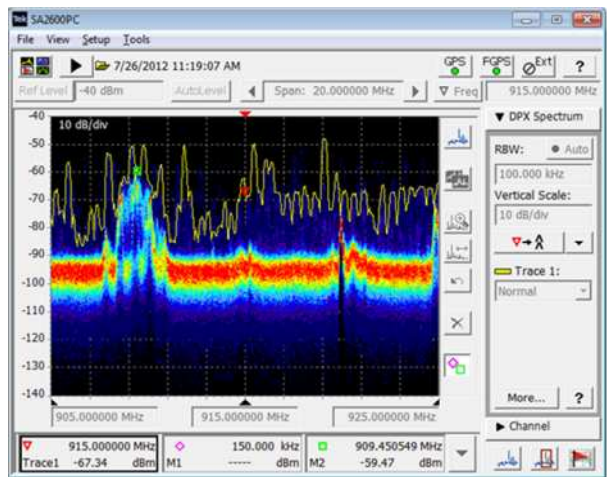
Spectrum Plots and Performance Across Channels

Note: Different plots have reference levels. This limited dynamic range of the spectrum analyzer will effect the overall noise floor measurements.

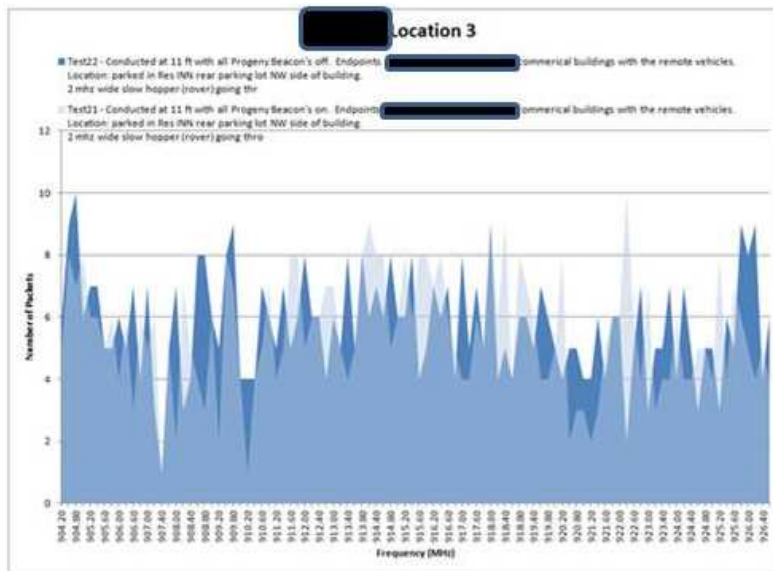
Progeny System On



Progeny System Off

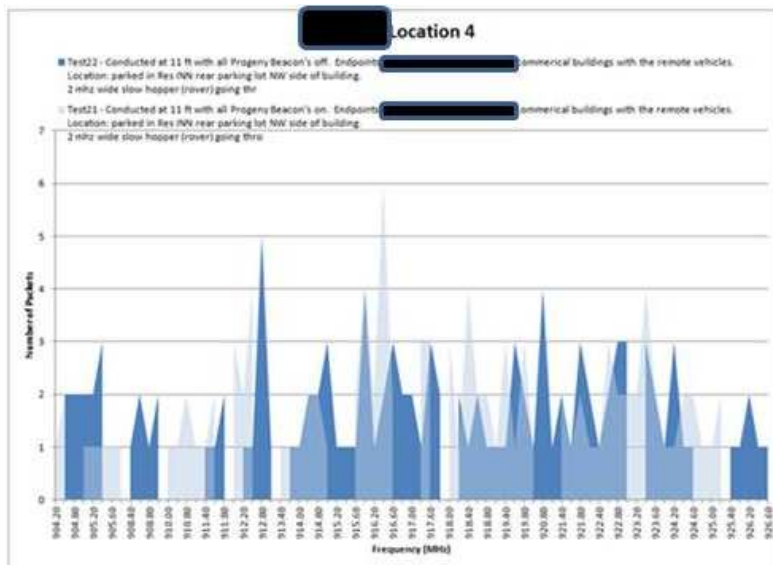


Test 22 and Test 21 (11 ft Antenna Ht.)



[REDACTED] ERT Group EP Location 3								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 22	11 ft	OFF	501	726	69		8	8
Test 21	11 ft	ON	470	724	64.9	4.1	8	8

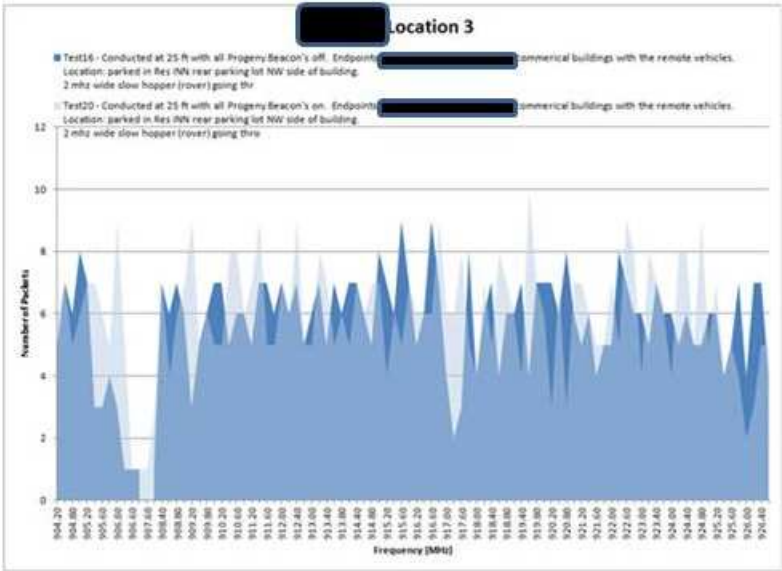
This is the decoded packet count for the endpoints at EP Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 22 with the Progeny system off. The light blue are the endpoint packets decoded from Test 21 with the Progeny system on.



[REDACTED] ERT Group EP Location 4								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 22	11 ft	OFF	42	882	4.8		6	11
Test 21	11 ft	ON	52	879	5.9	1.1	8	11

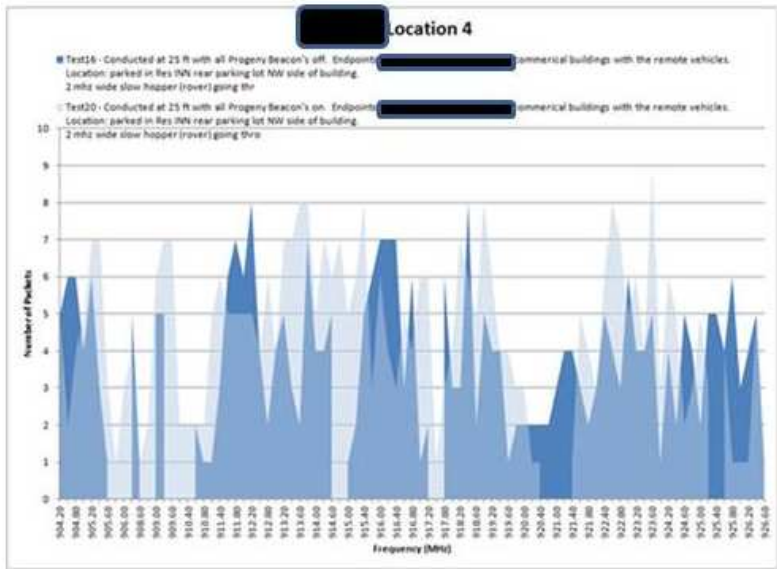
This is the decoded packet count for the endpoints at EP Location 4. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 22 with the Progeny system off. The light blue are the endpoint packets decoded from Test 21 with the Progeny system on.

Test 16 and Test 20 (25 ft. Antenna Ht.)



[redacted] ERT Group EP Location 3								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 16	25 ft	OFF	540	726	74.4		8	8
Test 20	25 ft	ON	528	726	78	-4.1	8	8

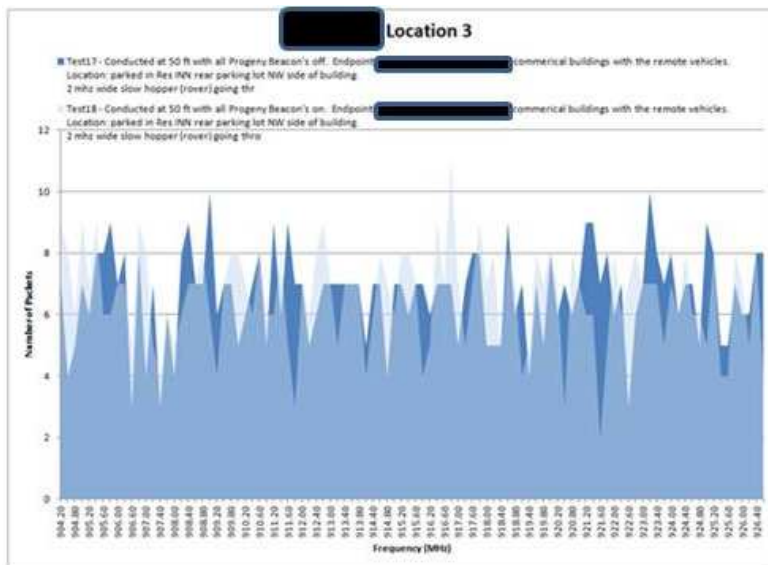
This is the decoded packet count for the endpoints at EP Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 16 with the Progeny system off. The light blue are the endpoint packets decoded from Test 20 with the Progeny system on.



[redacted] ERT Group EP Location 4								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 16	25 ft	OFF	315	882	35.7		11	11
Test 20	25 ft	ON	266	881	30.2	5.5	11	11

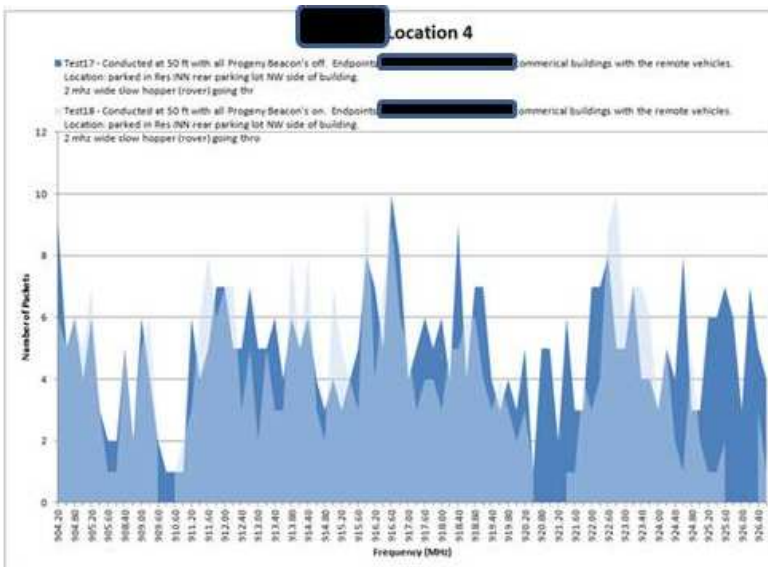
This is the decoded packet count for the endpoints at EP Location 4. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 16 with the Progeny system off. The light blue are the endpoint packets decoded from Test 20 with the Progeny system on.

Test 17 and Test 18 (50 ft. Antenna Ht.)



ERT Group EP Location 3								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 17	50 ft	OFF	668	728	91.8		8	8
Test 18	50 ft	ON	659	727	90.7	1.1	8	8

This is the decoded packet count for the endpoints at EP Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 17 with the Progeny system off. The light blue are the endpoint packets decoded from Test 18 with the Progeny system on.



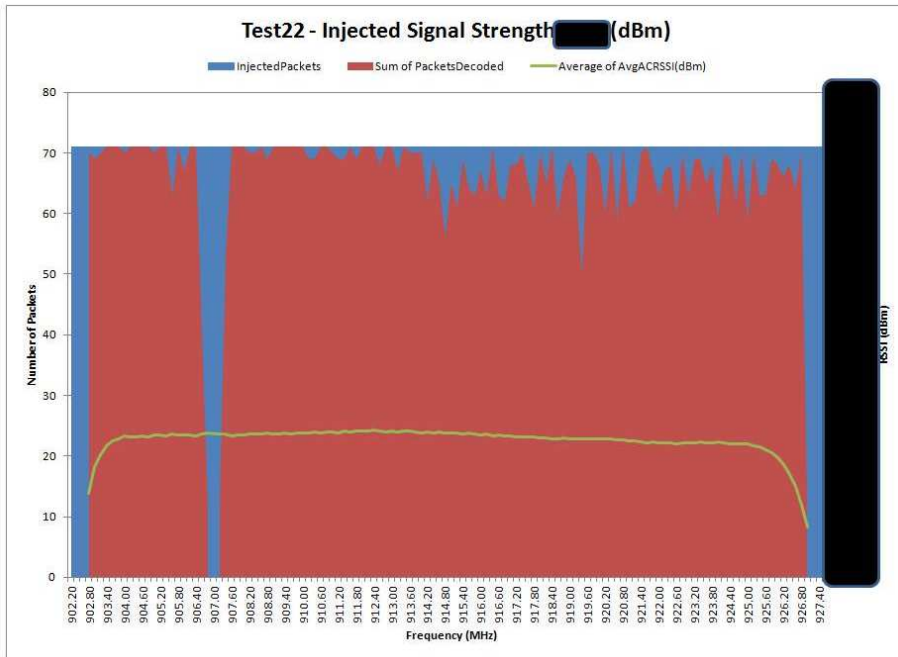
ERT Group EP Location 4								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 17	50 ft	OFF	421	883	47.7		11	11
Test 18	50 ft	ON	342	882	38.8	8.9	11	11

This is the decoded packet count for the endpoints at EP Location 4. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 17 with the Progeny system off. The light blue are the endpoint packets decoded from Test 18 with the Progeny system on.

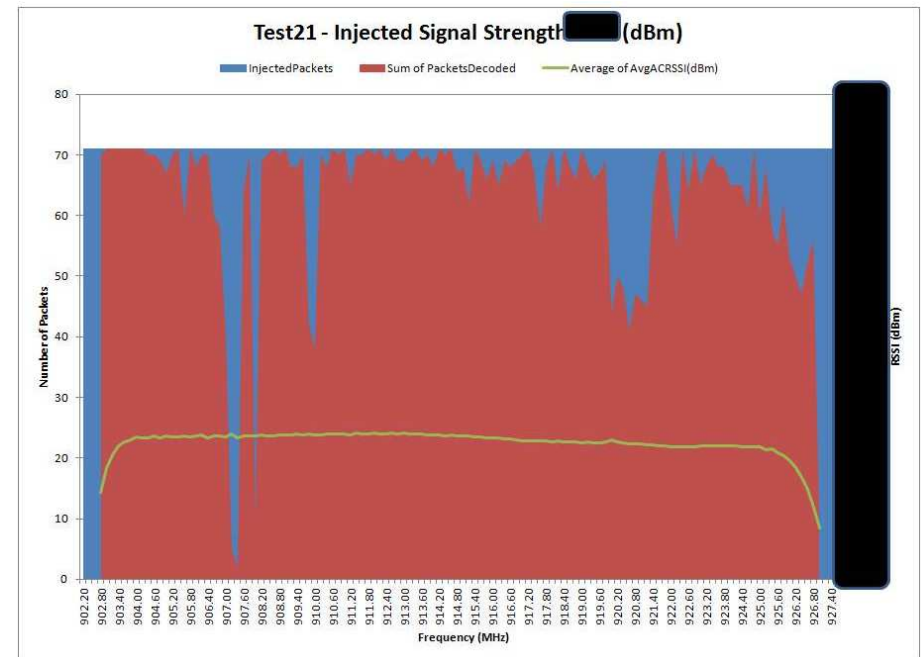
RF/PER Tests Showing Packet Success Rate

Test 22 and Test 21 (11 ft Antenna Ht.)

Packet Error Test Results

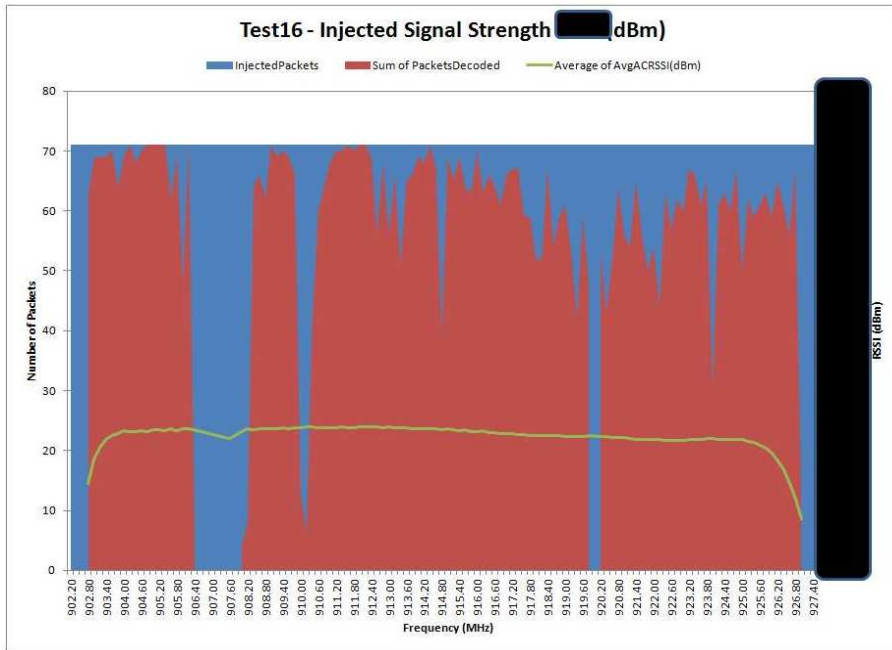


Test 22 with the antenna height at 11 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.

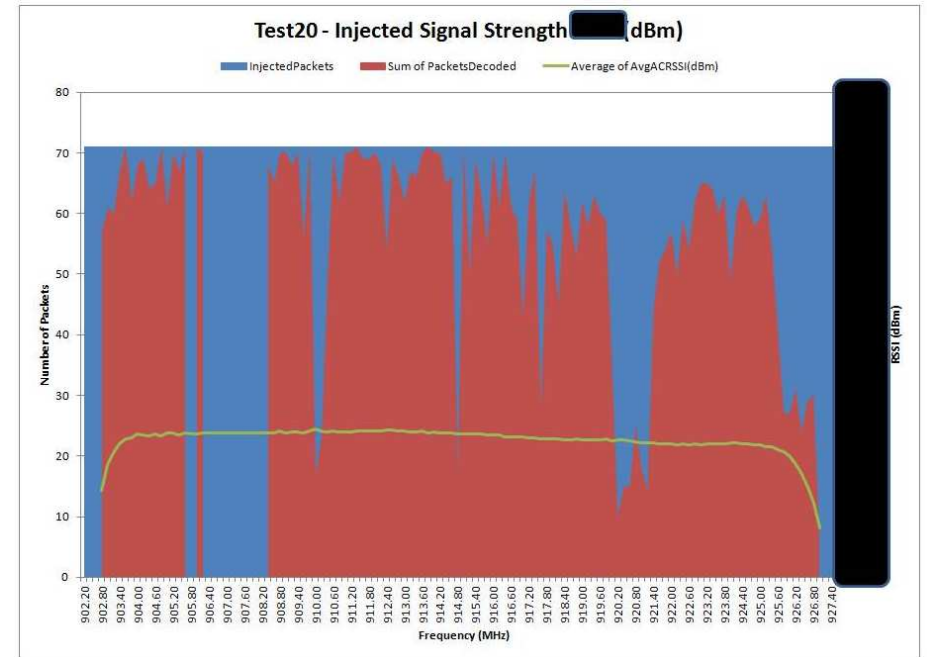


Test 21 with the antenna height at 11 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 16 and Test 20 (25 ft. Antenna Ht.)
 Packet Error Test Results

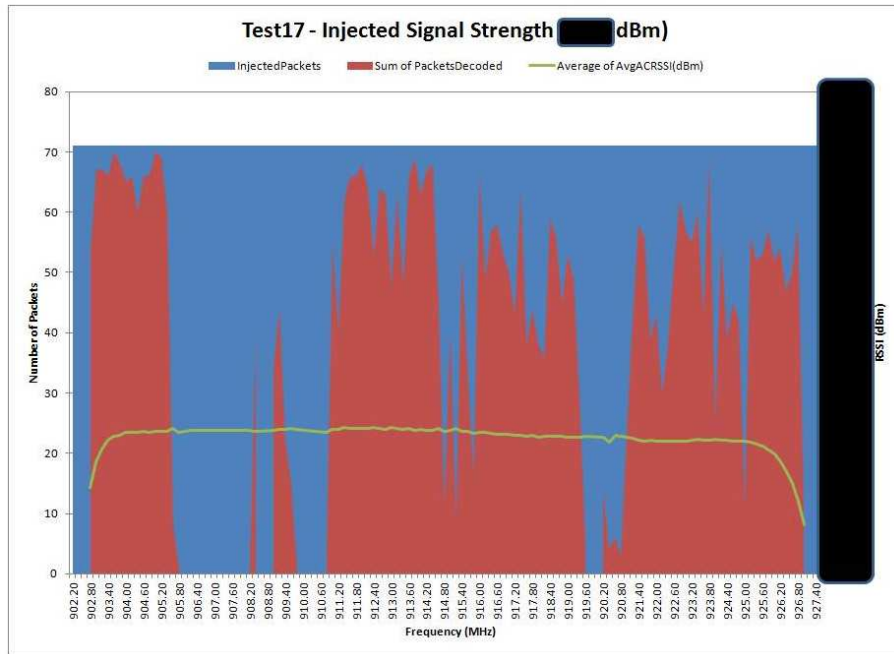


Test 16 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.

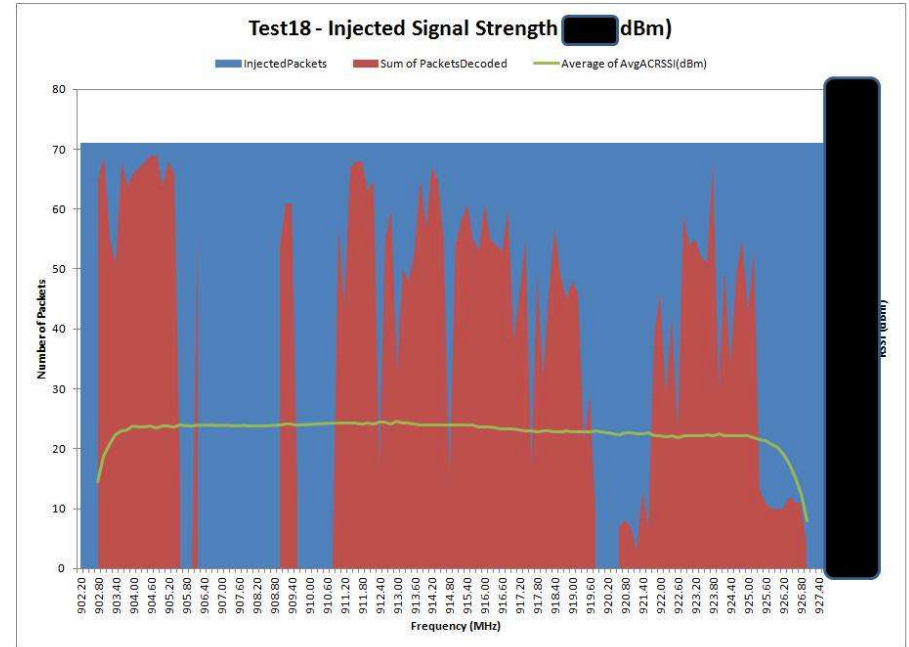


Test 20 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 17 and Test 18 (50 ft. Antenna Ht.)
 Packet Error Test Results



Test 17 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



Test 18 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Configuration 1 Location 2 Data: In attached spreadsheet - Location2directreads.xlsx

Location 3: Urban (colocation and close proximity)



Distances to the 3 closest beacons are: [REDACTED]

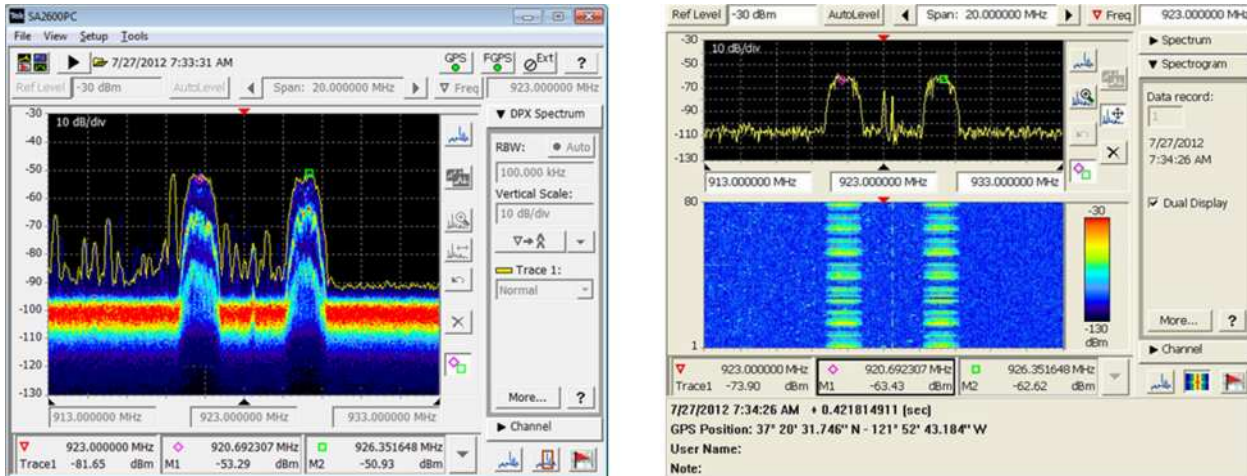
System Test: ERT to CCU Results Location 3

			[REDACTED] ERT Group EP Location 1						[REDACTED] ERT Group EP Location 2					
Test Number	Mast Height	Net OFF/ ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test26	11 ft	OFF	610	728	83.8		8	8	255	883	28.9		11	11
Test25	11 ft	ON	513	725	70.8	13	8	8	225	880	25.6	3.3	11	11
Test27	25 ft	OFF	645	728	88.6		8	8	473	884	53.5		11	11
Test24	25 ft	ON	524	724	72.3	16.3	8	8	318	879	36.2	17.3	11	11
Test28	50 ft	OFF	672	729	92.2		8	8	556	885	62.8		11	11
Test23	50 ft	ON	554	726	76.3	15.9	8	8	373	881	42.3	20.5	11	11

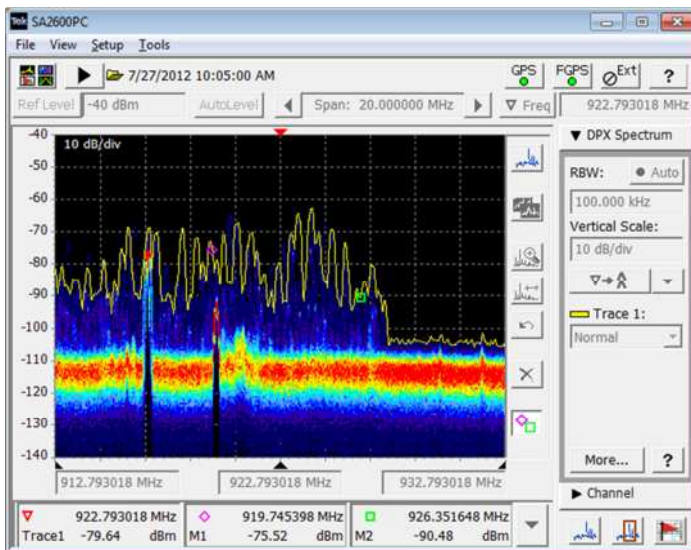
Spectrum Plots and Performance Across Channels

Note: Different plots have reference levels. This limited dynamic range of the spectrum analyzer will effects the overall noise floor measurements.

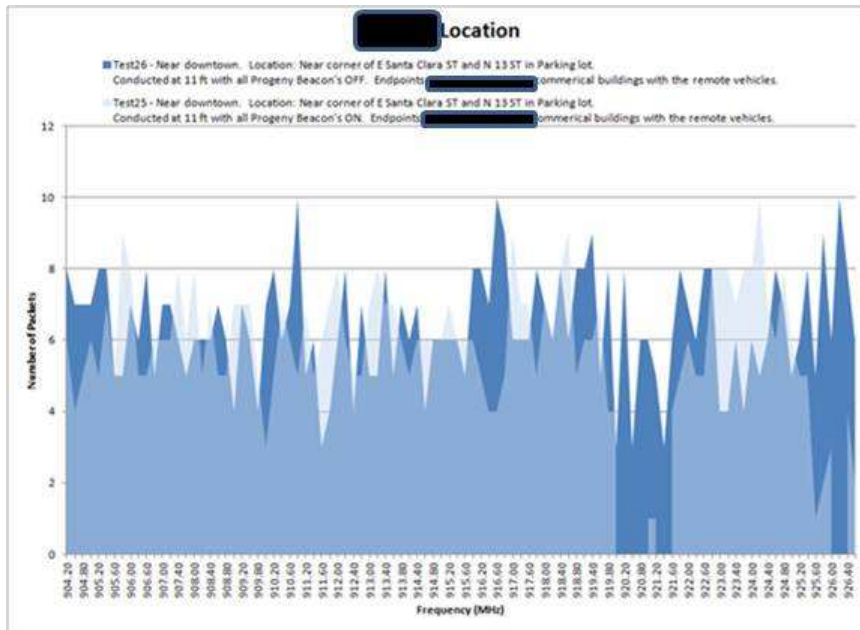
Progeny Sytem On



Progeny System Off

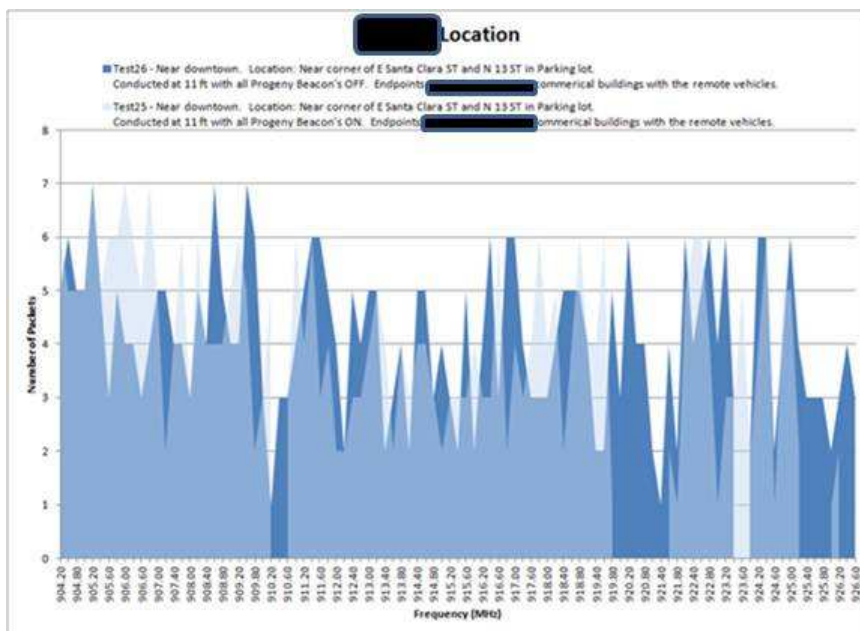


Test 26 and Test 25 (11 ft Antenna Ht.)



[Redacted] ERT Group EP Location 1								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 26	11ft	OFF	610	728	83.8		8	8
Test 25	11ft	ON	513	725	70.8	13	8	8

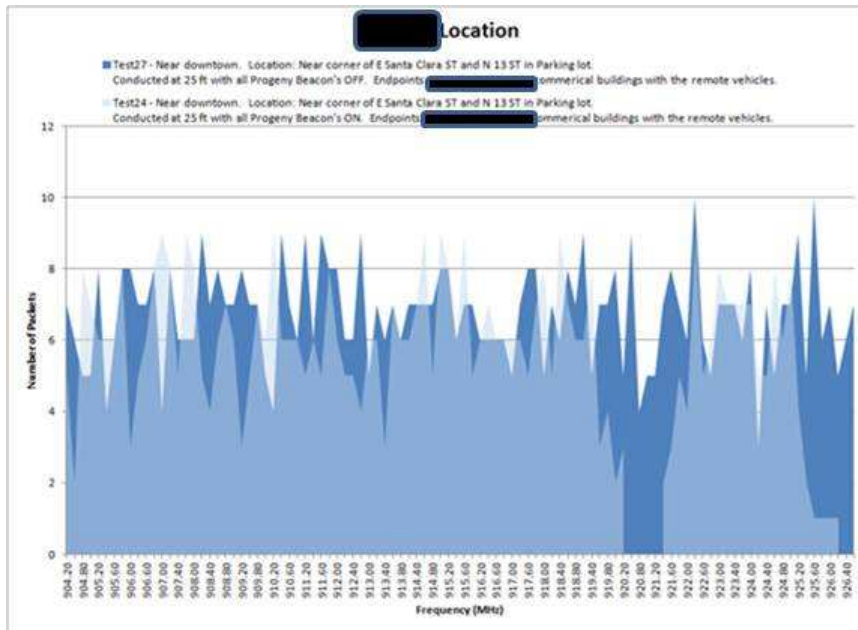
This is the decoded packet count for the endpoints at Location EP 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 26 with the Progeny system off. The light blue are the endpoint packets decoded from Test 25 with the Progeny system on.



[Redacted] ERT Group EP Location 2								
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 26	11 ft	OFF	255	883	28.9		11	11
Test 25	11 ft	ON	225	880	25.6	3.3	11	11

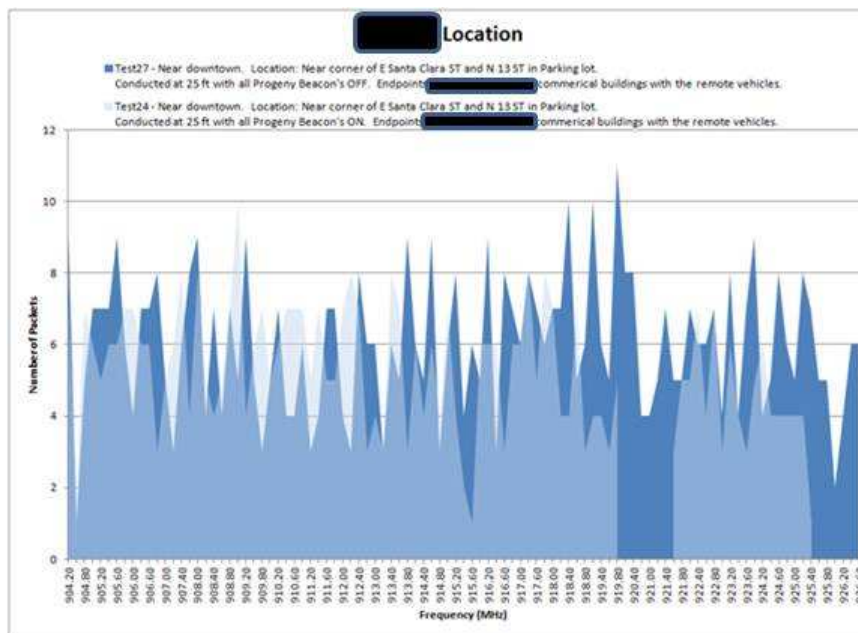
This is the decoded packet count for the endpoints at EP Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 26 with the Progeny system off. The light blue are the endpoint packets decoded from Test 25 with the Progeny system on.

Test 27 and Test 24 (25 ft. Antenna Ht.)



			[Redacted] ERT Group EP Location 1					
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 27	25 ft	OFF	645	728	88.6		8	8
Test 24	25 ft	ON	524	724	72.3	16.3	8	8

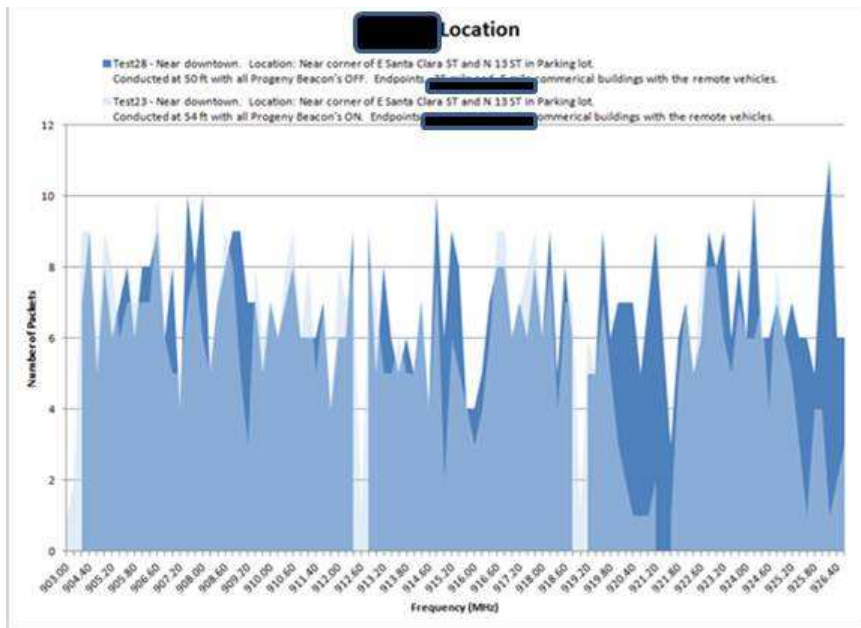
This is the decoded packet count for the endpoints at EP Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 27 with the Progeny system off. The light blue are the endpoint packets decoded from Test 24 with the Progeny system on.



			[Redacted] ERT Group EP Location 2					
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 27	25 ft	OFF	473	884	53.5		11	11
Test 24	25 ft	ON	318	879	36.2	17.3	11	11

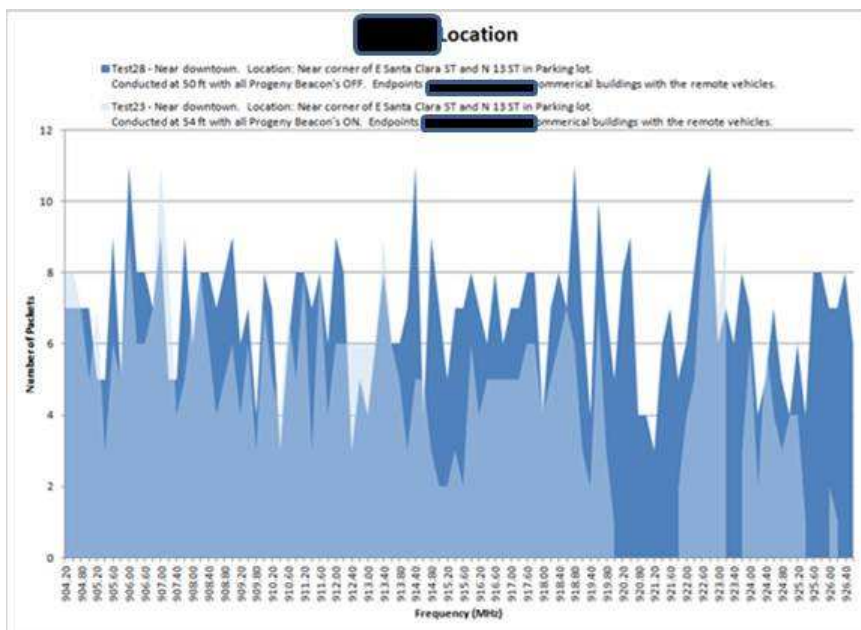
This is the decoded packet count for the endpoints at EP Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 27 with the Progeny system off. The light blue are the endpoint packets decoded from Test 24 with the Progeny system on.

Test 28 and Test 23 (50 ft. Antenna Ht.)



		ERT Group EP Location 1						
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 28	50 ft	OFF	672	729	92.2		8	8
Test 23	50 ft	ON	554	726	76.3	15.9	8	8

This is the decoded packet count for the endpoints at EP Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 28 with the Progeny system off. The light blue are the endpoint packets decoded from Test 23 with the Progeny system on.

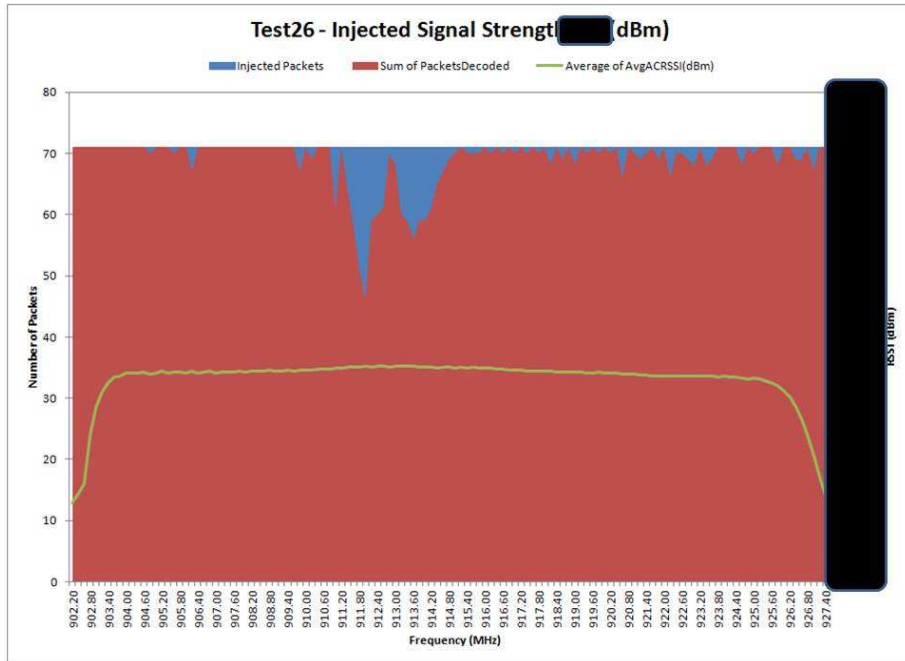


		ERT Group EP Location 2						
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 28	50 ft	OFF	556	885	62.8		11	11
Test 23	50 ft	ON	373	881	42.3	20.5	11	11

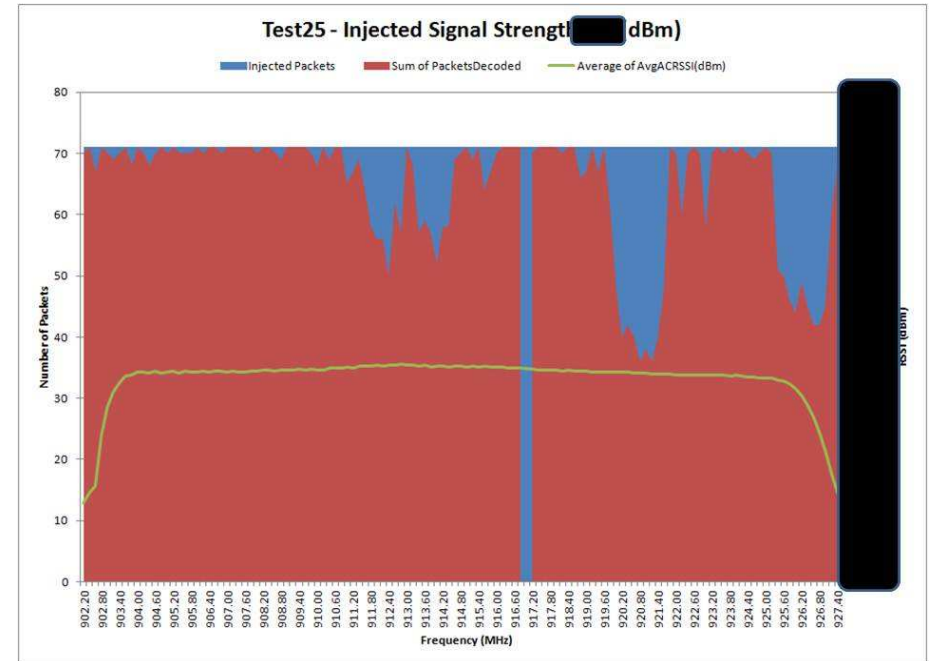
This is the decoded packet count for the endpoints at EP Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 28 with the Progeny system off. The light blue are the endpoint packets decoded from Test 23 with the Progeny system on.

RF/PER Tests Showing Packet Success Rate

Test 26 and Test 25 (11 ft Antenna Ht.) Packet Error Test Results

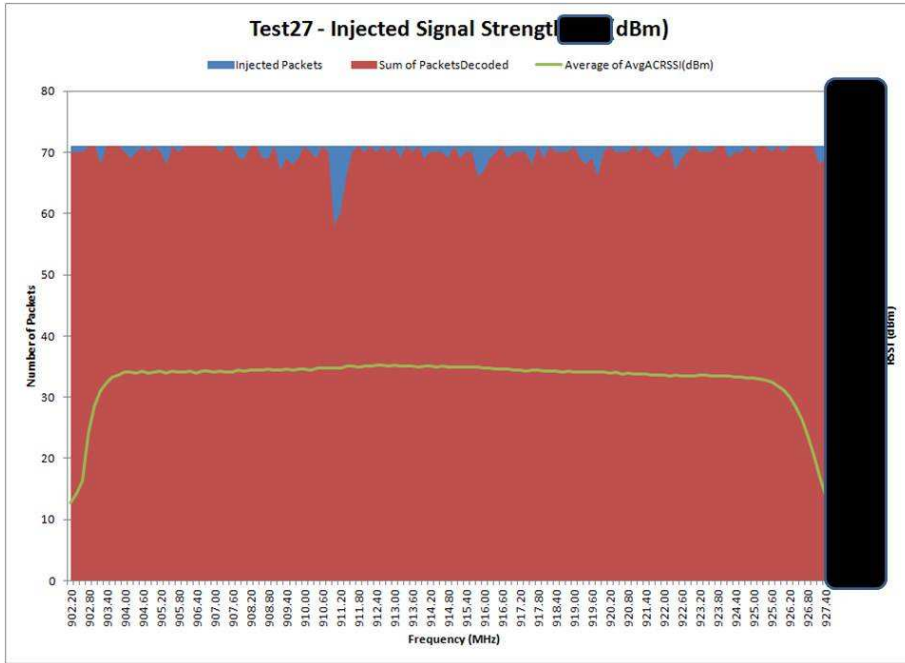


Test 26 with the antenna height at 11 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.

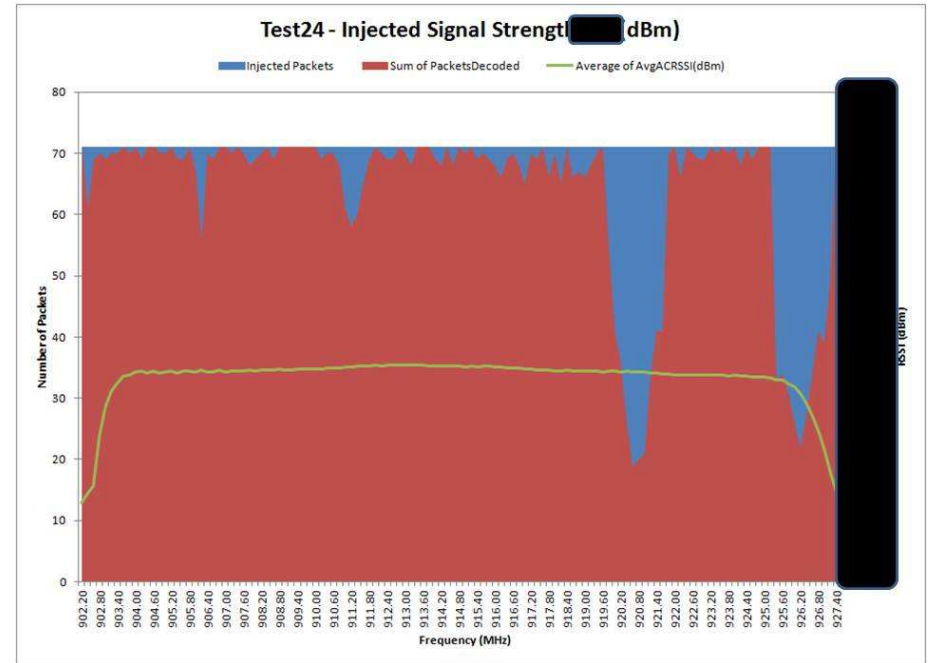


Test 25 with the antenna height at 11 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 27 and Test 24 (25 ft. Antenna Ht.)
 Packet Error Test Results

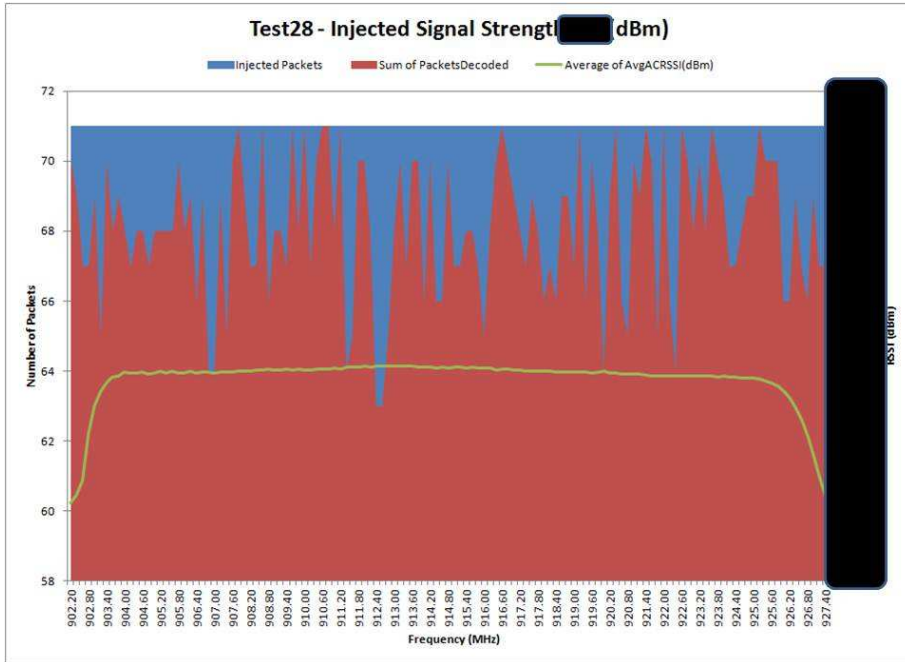


Test 27 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.

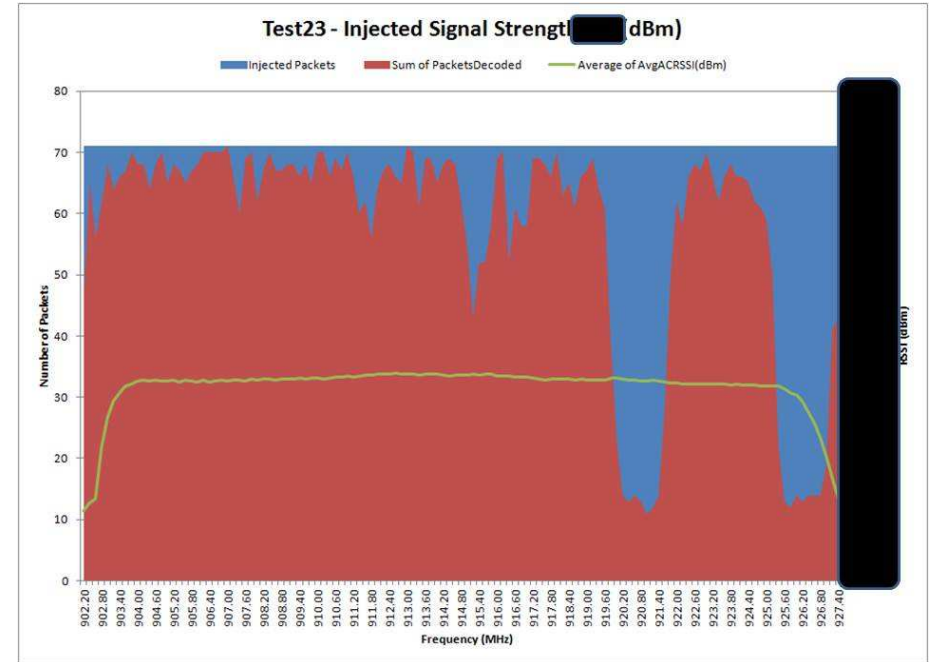


Test 24 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 28 and Test 23 (50 ft. Antenna Ht.)
Packet Error Test Results



Test 28 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



Test 23 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Configuration 1 Location 3 Data: In attached spreadsheet - [Location3directreads.xlsx](#)

Configuration 2: CCU and Repeater Tests:

Location 1: Suburban (close proximity, but no colocation)



Distances to the 3 closest beacons are: [REDACTED].

Packet Error Test	Mast Height	Progeny System Status	Endpoint Location 1	Endpoint Location 2	Endpoint Channel Plan	Repeater Location	Repeater Channel Plan	Test ID
All Channels	25 ft	OFF	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 41
	50 ft	OFF	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 42
	25 ft	ON	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 40
	50 ft	ON	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 39

System Tests: ERT to CCU Direct Link Results Location 1

EP Loc 1 = [REDACTED] ERTs, EP Loc 2 = [REDACTED] ERTs, Rx = CCU

Location 1				DIRECT LINK FROM ERTs TO CCU											
Test Number	Mast Height	Net OFF/ON	Duration	EP Loc1->Rx						EP Loc2->Rx					
				Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd	ERTS Expd	Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd	ERTS Expd
Test41	25	OFF	90:55	2,122	3,091	68.6%		11	11	891	2,364	37.7%		7	7
Test40	25	ON	90:00	1,939	3,060	63.4%	5.3	11	11	793	2,340	33.9%	3.8	7	7
Test42	50	OFF	89:54	2,382	3,057	77.9%		11	11	1,419	2,337	60.7%		7	7
Test39	50	ON	89:21	1,958	3,038	64.5%	13.5	11	11	1,113	2,323	47.9%	12.8	7	7

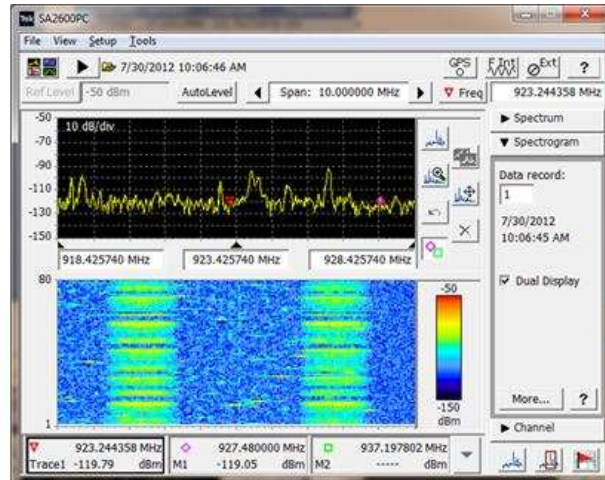
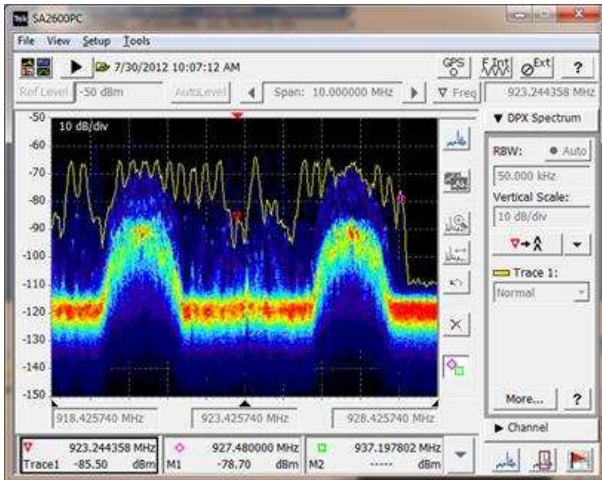
Location 1				Endpoint to Repeater to CCU								
Test Number	Mast Height	Net OFF/ON	Duration	EP Loc1->RPT->CCU								
				CCU Pkts Rcvd	Pkst Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd	ERTS Expd
Test41	25	OFF	90:55	2,891	2,927	3,091	98.8%		94.7%		11	11
Test40	25	ON	90:00	2,782	2,827	3,060	98.4%	0.4	92.4%	2.3	11	11
Test42	50	OFF	89:54	2,754	2,769	3,057	99.5%		90.6%		11	11
Test39	50	ON	89:21	2,673	2,729	3,038	97.9%	1.5	89.8%	0.8	11	11

Location 1				Endpoint to Repeater to CCU								
Test Number	Mast Height	Net OFF/ON	Duration	EP Loc2->RPT->CCU								
				CCU Pkts Rcvd	Pkst Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd	ERTS Expd
Test41	25	OFF	90:55	1,675	1,702	2,364	98.4%		72.0%		7	7
Test40	25	ON	90:00	1,515	1,542	2,340	98.2%	0.2	65.9%	6.1	7	7
Test42	50	OFF	89:54	1,630	1,638	2,337	99.5%		70.1%		7	7
Test39	50	ON	89:21	1,448	1,467	2,323	98.7%	0.8	63.1%	7.0	7	7

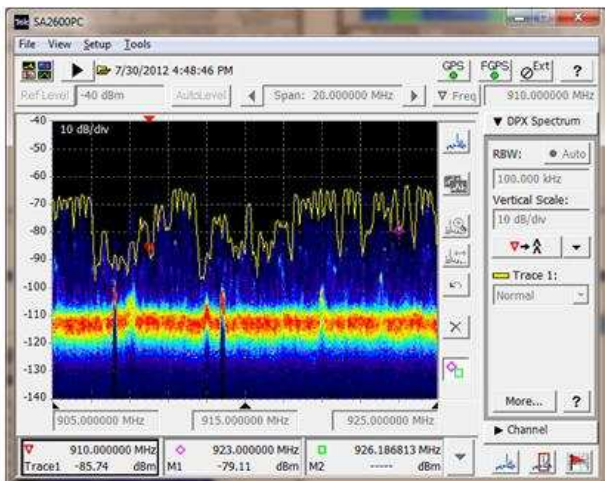
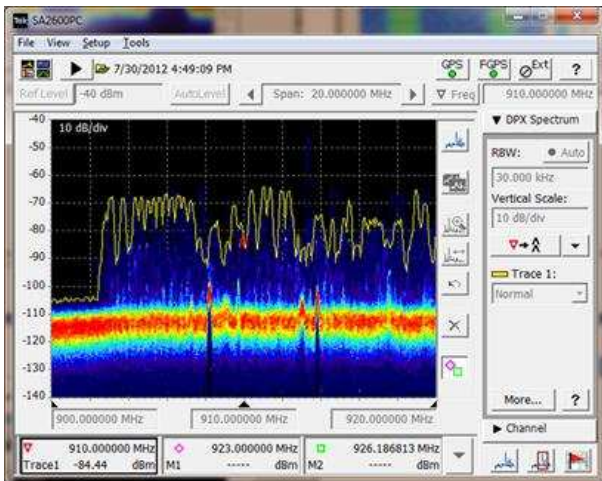
Spectrum Plots and Performance Across Channels

Note: Different plots have reference levels. This limited dynamic range of the spectrum analyzer will effects the overall noise floor measurements.

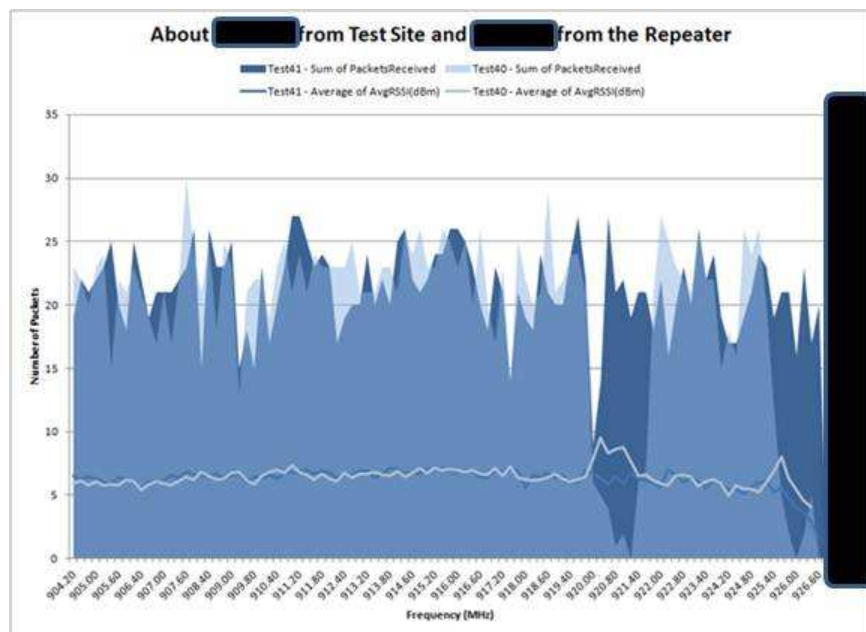
Progeny System On



Progeny System Off

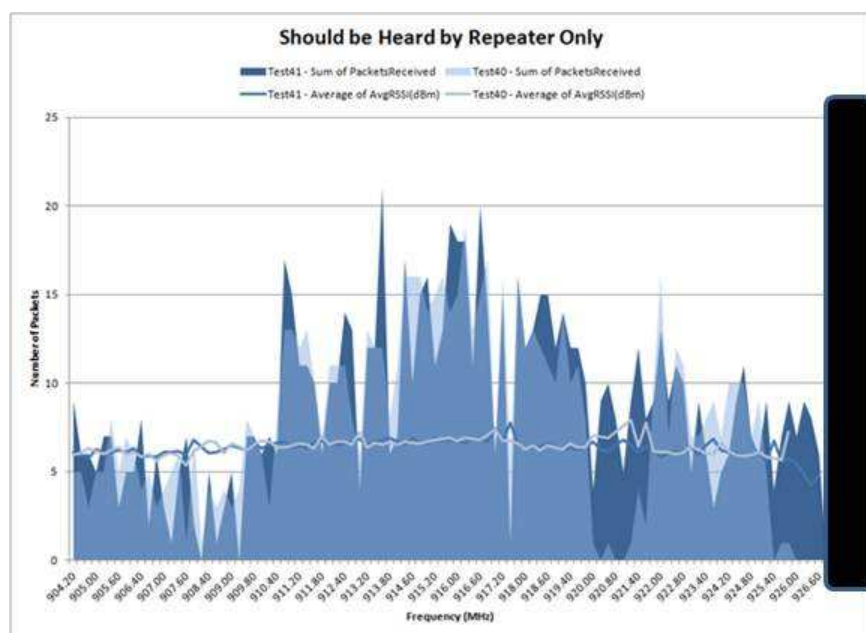


Test 41 and Test 40 (25 ft. Antenna Ht.)



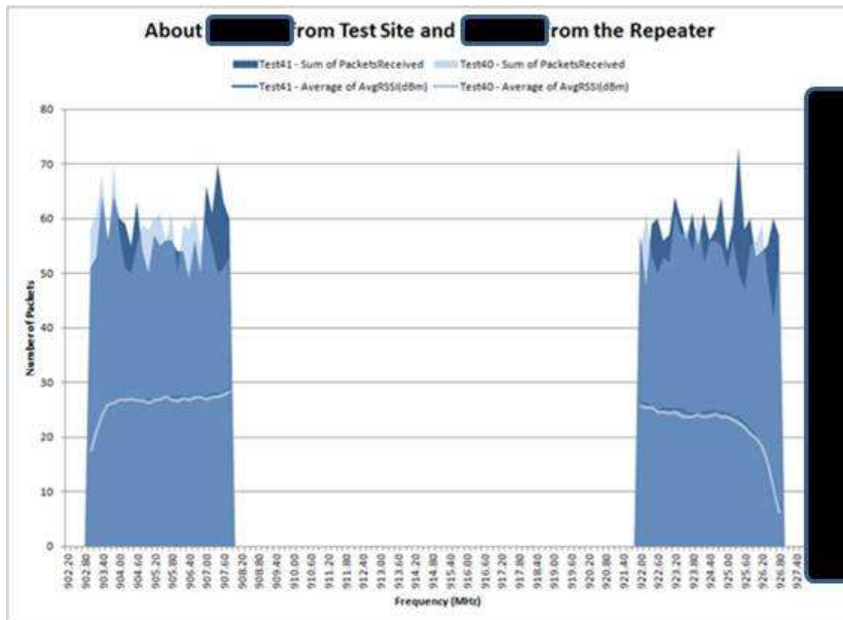
Test Number	Mast Height	Net OFF/ON	EP Loc1->Rx					
			Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd	ERTS Expd
Test 41	25	OFF	2,122	3,091	68.60%		11	11
Test 40	25	ON	1,939	3,060	63.40%	5.3	11	11

This is the decoded packet count for the endpoints at EP Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 41 with the Progeny system off. The light blue are the endpoint packets decoded from Test 40 with the Progeny system on.



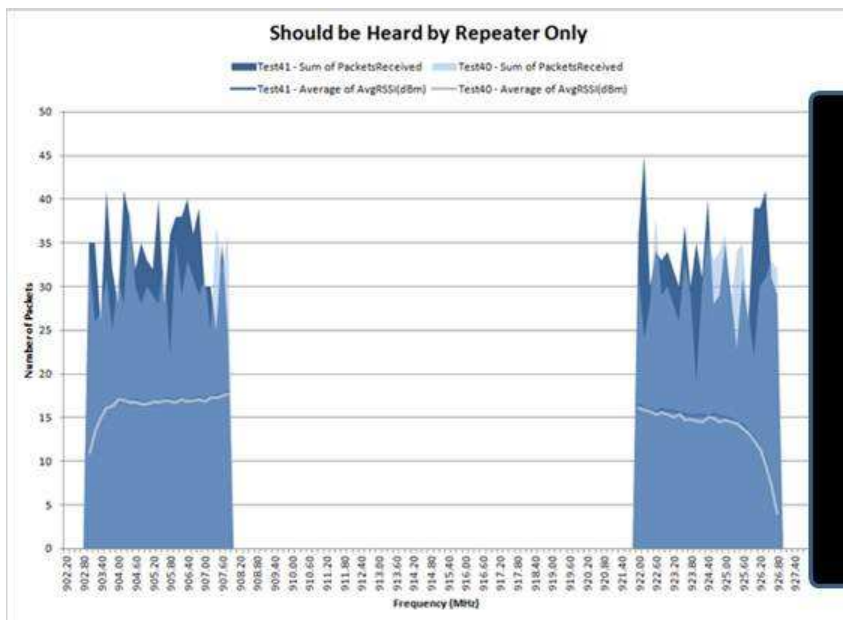
Test Number	Mast Height	Net OFF/ON	EP Loc2->Rx					
			Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd	ERTS Expd
Test 41	25	OFF	891	2,364	37.70%		7	7
Test 40	25	ON	793	2,340	33.90%	3.8	7	7

This is the decoded packet count for the endpoints at EP Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 41 with the Progeny system off. The light blue are the endpoint packets decoded from Test 40 with the Progeny system on.



Test Number	Mast Height	Net Off/ ON	EP Loc1->RPT->CCU								
			CCU Pkts Rcvd	Pkts Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd	ERTs Expd
Test 41	25	OFF	2,891	2,927	3,091	98.8%		94.7%		11	11
Test 40	25	ON	2,782	2,827	3,060	98.4%	0.4	92.4%	2.3	11	11

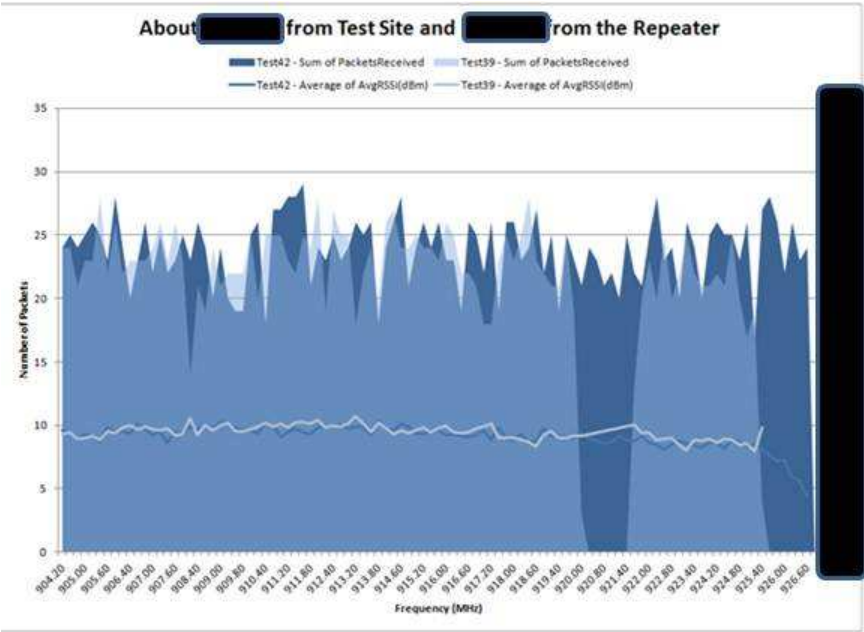
This is the decoded packet count for the endpoints at EP Location 1 retransmitted through the repeater [redacted] at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 41 with the Progeny system off. The light blue are the endpoint packets decoded from Test 40 with the Progeny system on.



Test Number	Mast Height	Net Off/ON	EP Loc2->RPT->CCU								
			CCU Pkts Rcvd	Pkts Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd	ERTs Expd
Test 41	25	OFF	1,675	1,702	2,364	98.4%		72.0%		7	7
Test 40	25	ON	1,515	1,542	2,340	98.2%	0.2	65.9%	6.1	7	7

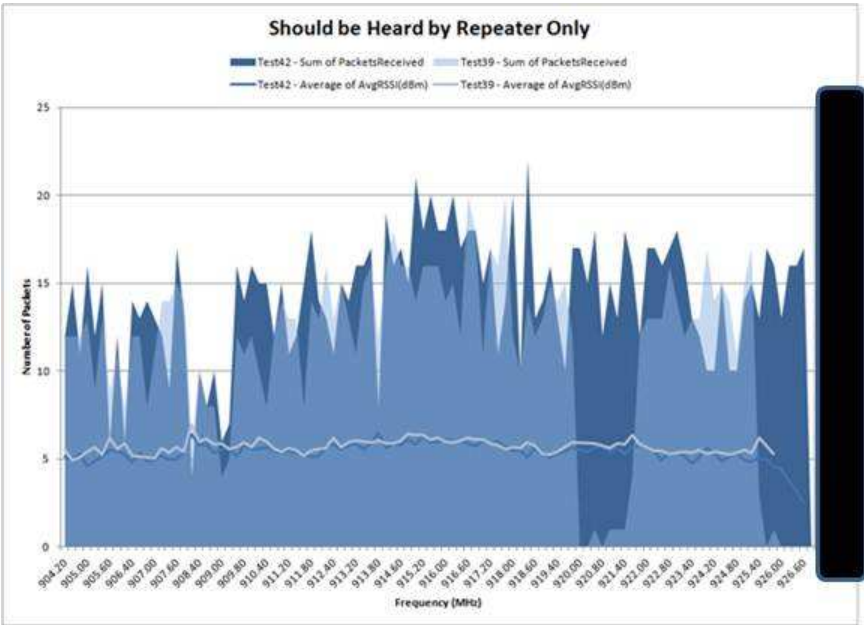
This is the decoded packet count for the endpoints at EP Location 2 retransmitted through the repeater [redacted] at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 41 with the Progeny system off. The light blue are the endpoint packets decoded from Test 40 with the Progeny system on.

Test 42 and Test 39 (50 ft. Antenna Ht.)



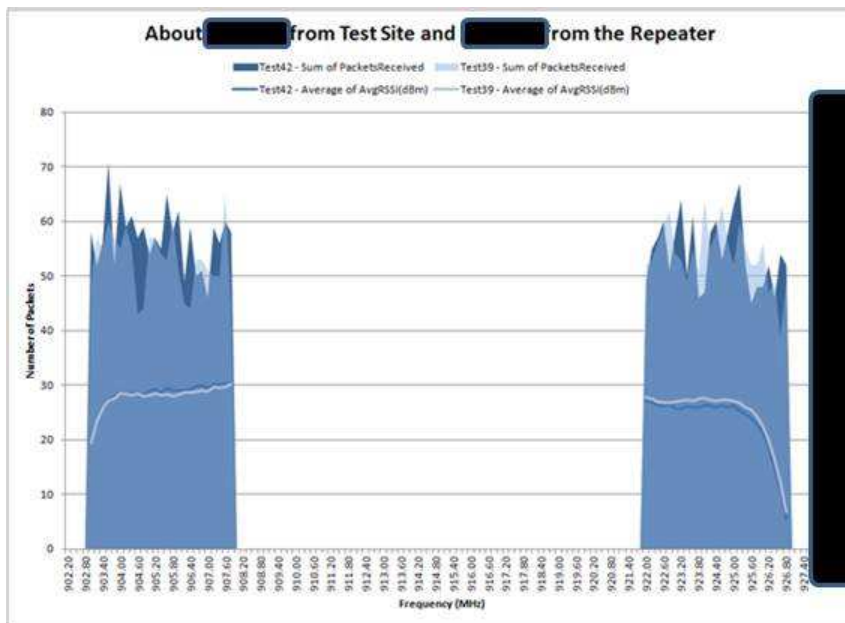
Test Number	Mast Height	Net OFF/ON	EP Loc1->Rx					
			Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd	ERTS Expd
Test 42	50	OFF	2,382	3,057	77.90%		11	11
Test 39	50	ON	1,958	3,038	64.50%	13.5	11	11

This is the decoded packet count for the endpoints at EP Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 42 with the Progeny system off. The light blue are the endpoint packets decoded from Test 39 with the Progeny system on.



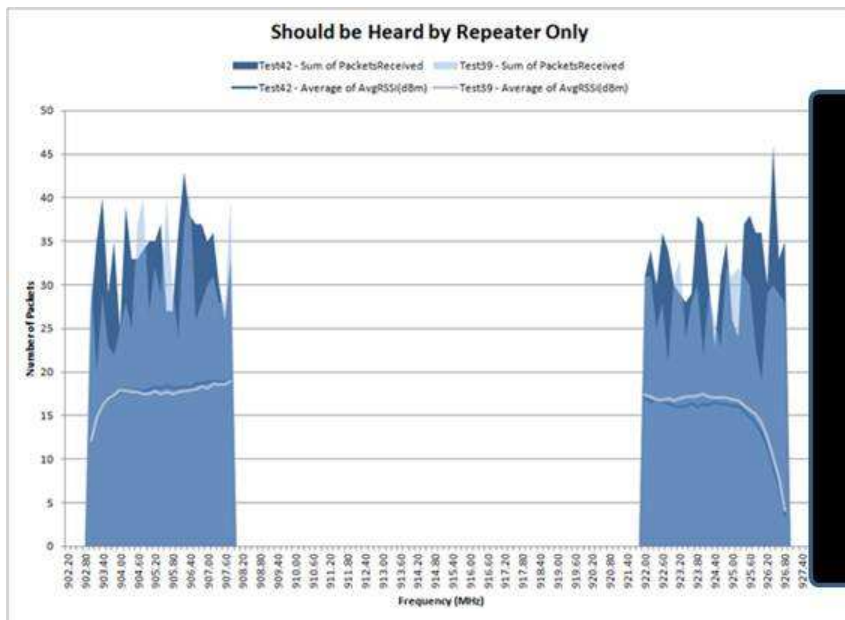
Test Number	Mast Height	Net OFF/ON	EP Loc2->Rx					
			Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd	ERTS Expd
Test 42	50	OFF	1419	2,337	60.70%		7	7
Test 39	50	ON	1113	2,323	47.90%	12.8	7	7

Thzs is the decoded packet count for the endpoints at EP Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 42 with the Progeny system off. The light blue are the endpoint packets decoded from Test 39 with the Progeny system on.



Test Number	Mast Height	Net Off/ ON	EP Loc1->RPT->CCU								
			CCU Pkts Rcvd	Pkst Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd	ERTS Expd
Test 42	50	OFF	2,754	2,769	3,057	99.5%		90.6%		11	11
Test 39	50	ON	2,673	2,729	3,038	97.9%	1.5	89.8%	0.8	11	11

This is the decoded packet count for the endpoints at EP Location 1 retransmitted through the repeater [REDACTED] at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 42 with the Progeny system off. The light blue are the endpoint packets decoded from Test 39 with the Progeny system on. {Do not believe this is correct as it does not match the chart legend}

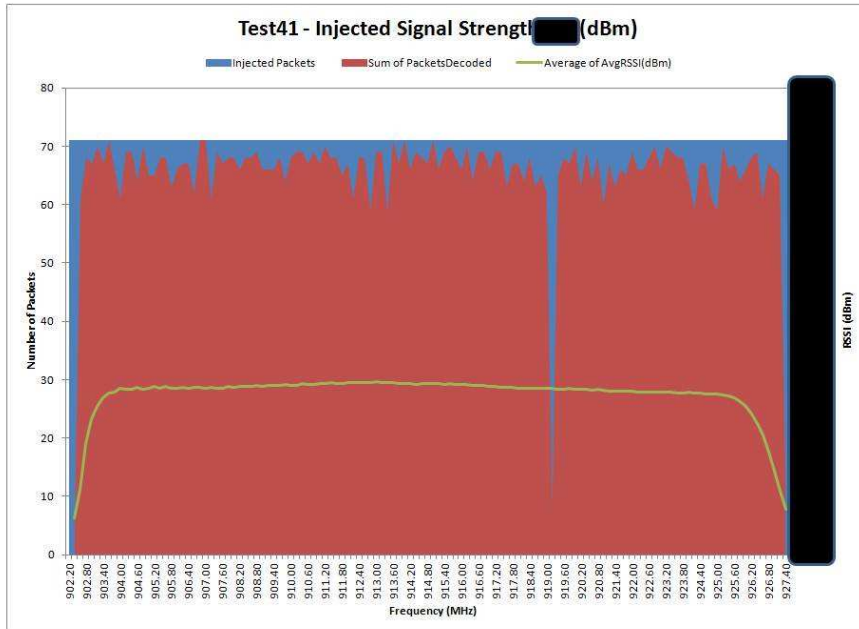


Test Number	Mast Height	Net Off/ ON	EP Loc2->RPT->CCU								
			CCU Pkts Rcvd	Pkst Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd	ERTS Expd
Test 42	50	OFF	1,630	1,638	2,337	99.5%		70.1%		7	7
Test 39	50	ON	1,448	1,467	2,323	98.7%	0.8	63.1%		7	7

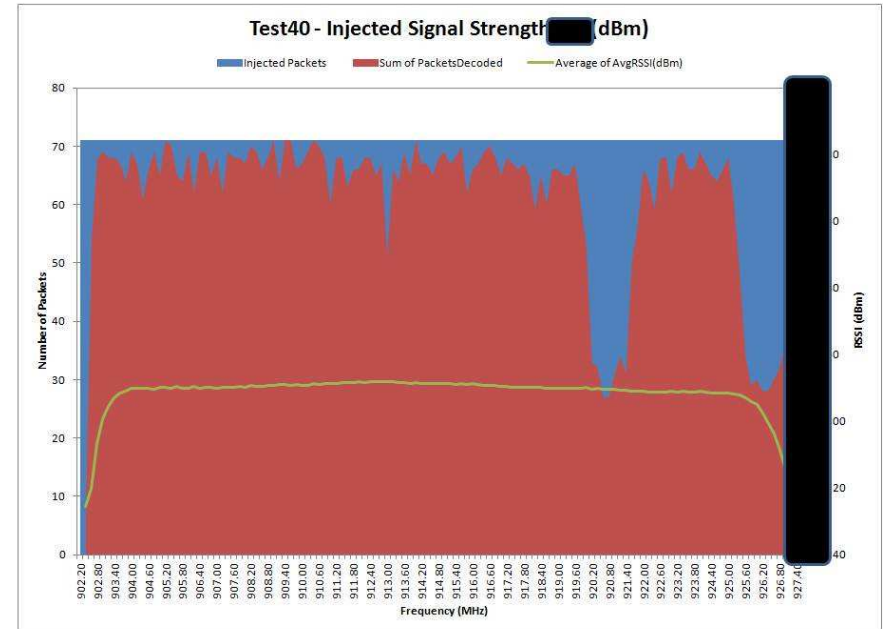
This is the decoded packet count for the endpoints at EP Location 2 retransmitted through the repeater [REDACTED] at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 42 with the Progeny system off. The light blue are the endpoint packets decoded from Test 39 with the Progeny system on. {Do not believe this is correct as it does not match the chart legend}

RF/PER Tests Showing Packet Success Rate

Test 41 and Test 40 (25 ft. Antenna Ht.) Packet Error Test Results

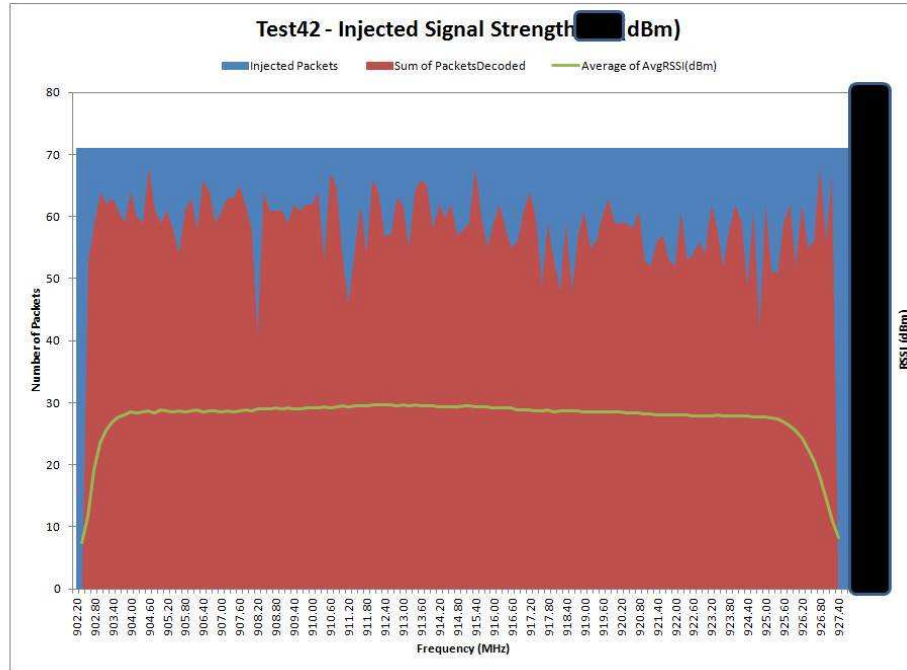


Test 41 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.

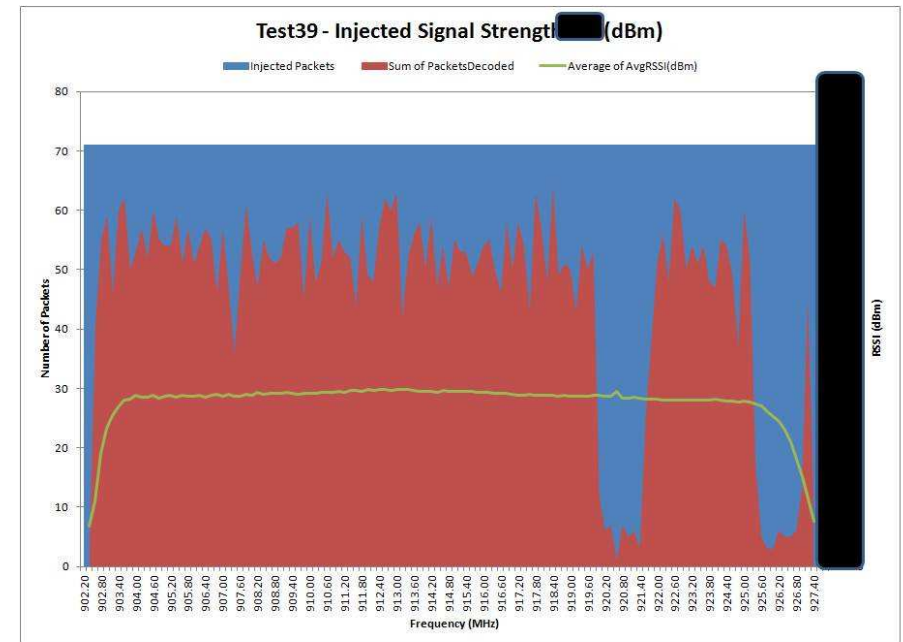


Test 40 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 42 and Test 39 (50 ft. Antenna Ht.)
 Packet Error Test Results



Test 42 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



Test 39 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Configuration 2 Location 1 Data: In attached spreadsheet - [Location1repeaterreads.xlsx](#)

Location 2: Suburban (no close proximity and no colocation)



Distances to the 3 closest beacons are: [REDACTED].

Packet Error Test	Mast Height	Progeny System Status	Endpoint Location 1	Endpoint Location 2	Endpoint Channel Plan	Repeater Location	Repeater Channel Plan	Test ID
All Channels	25 ft	OFF	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 50
	50 ft	OFF	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 49
	25 ft	ON	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 47
	50 ft	ON	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 48

System Test: ERT to CCU All Link Results Location 2

EP Loc 1 = [REDACTED] ERTs, EP Loc 2 = [REDACTED] ERTs, Rx = CCU

Location 2				DIRECT LINK FROM ERTs TO CCU											
Test Number	Mast Height	Net OFF/ON	Duration	EP Loc1->Rx						EP Loc2->Rx					
				Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd	ERTS Expd	Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd	ERTS Expd
Test50	25	OFF	84:31	306	2,366	12.9%		7	8	0	2,874	0.0%		0	11
Test47	25	ON	97:58	210	2,743	7.7%	5.3	7	8	0	3,331	0.0%	0.0	0	11
Test49	50	OFF	91:55	703	2,574	27.3%		7	8	64	3,125	2.0%		8	11
Test48	50	ON	95:35	655	2,676	24.5%	2.8	8	8	66	3,250	2.0%	0.0	10	11

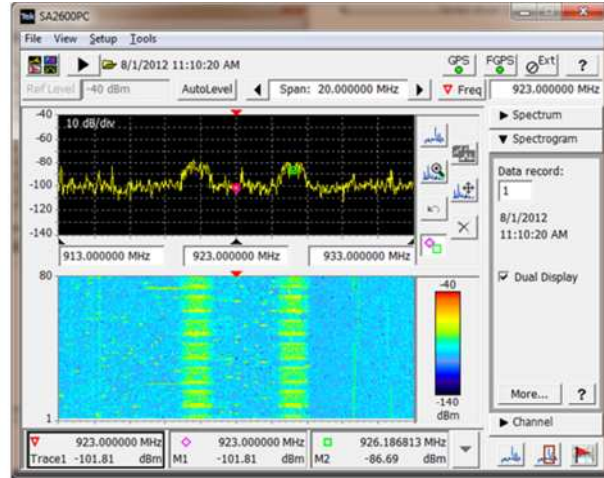
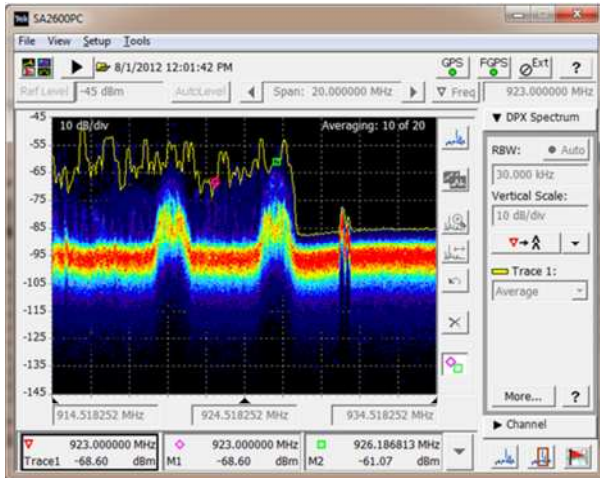
Location 2				Endpoint to Repeater to CCU									
Test Number	Mast Height	Net OFF/ON	Duration	EP Loc1->RPT->CCU									
				CCU Pkts Rcvd	Pkst Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd	ERTS Expd	
Test50	25	OFF	84:31	888	1,395	2,367	63.7%		58.9%		8	8	
Test47	25	ON	97:58	930	1,661	2,743	56.0%	7.7	60.6%	-1.7	8	8	
Test49	50	OFF	91:55	1,278	1,632	2,574	78.3%		63.4%		8	8	
Test48	50	ON	95:35	991	1,499	2,677	66.1%	12.2	56.0%	7.4	8	8	

Location 2				Endpoint to Repeater to CCU								
Test Number	Mast Height	Net OFF/ON	Duration	EP Loc2->RPT->CCU								
				CCU Pkts Rcvd	Pkst Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd	ERTS Expd
Test50	25	OFF	84:31	800	1,195	2,874	66.9%		41.6%		11	11
Test47	25	ON	97:58	859	1,511	3,331	56.8%	10.1	45.4%	-3.8	11	11
Test49	50	OFF	91:55	1,126	1,410	3,125	79.9%		45.1%		11	11
Test48	50	ON	95:35	870	1,399	3,250	62.2%	17.7	43.0%	2.1	11	11

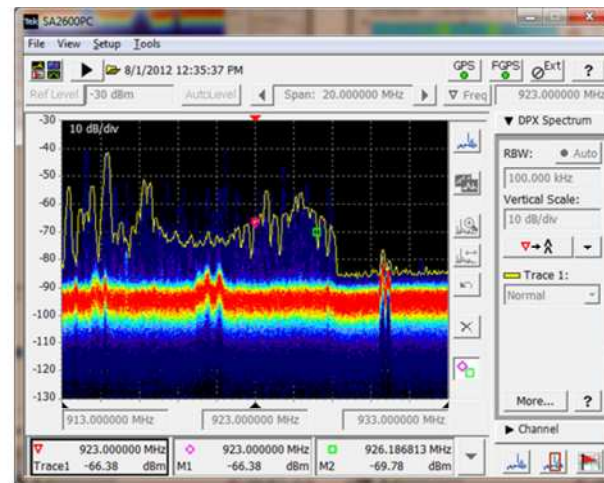
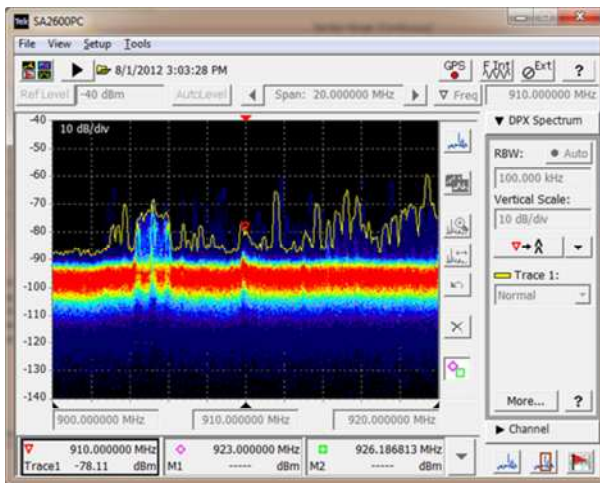
Spectrum Plots and Performance Across Channels

Note: Different plots have reference levels. This limited dynamic range of the spectrum analyzer will effects the overall noise floor measurements.

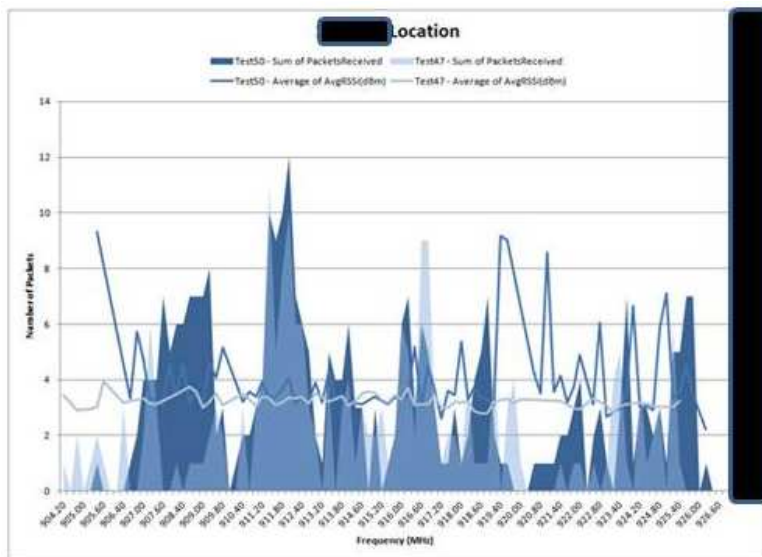
Progeny System On



Progeny System Off

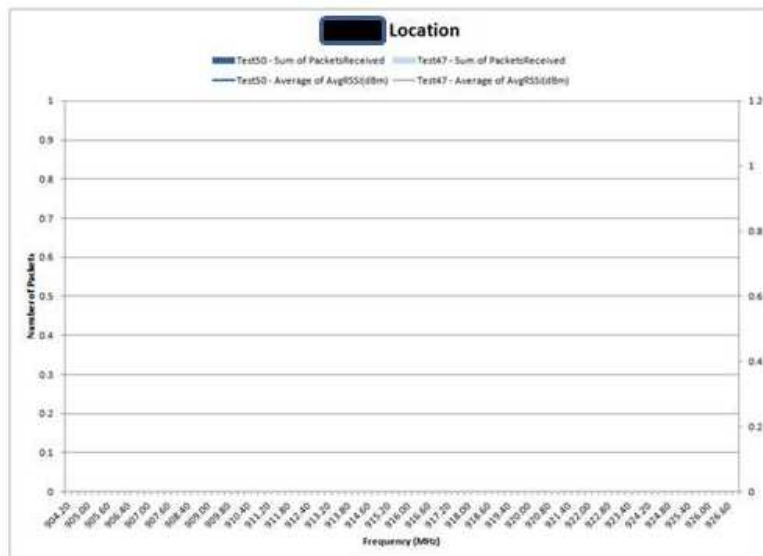


Test 50 and Test 47 (25 ft. Antenna Ht.)



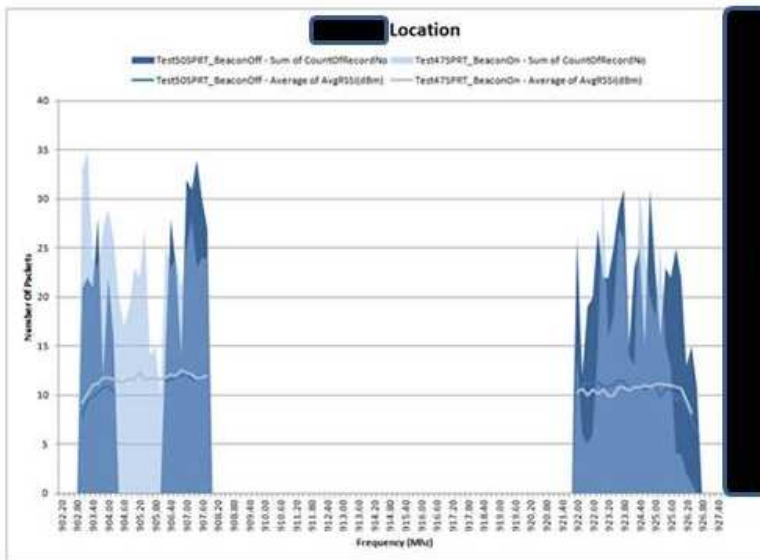
Test Number	Mast Height	Net OFF/ON	EP Loc1->Rx				
			Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd
Test 50	25	OFF	306	2,366	12.90%		7
Test 47	25	ON	210	2,743	7.70%	5.3	8

This is the decoded packet count for the endpoints at EP Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 50 with the Progeny system off. The light blue are the endpoint packets decoded from Test 47 with the Progeny system on.



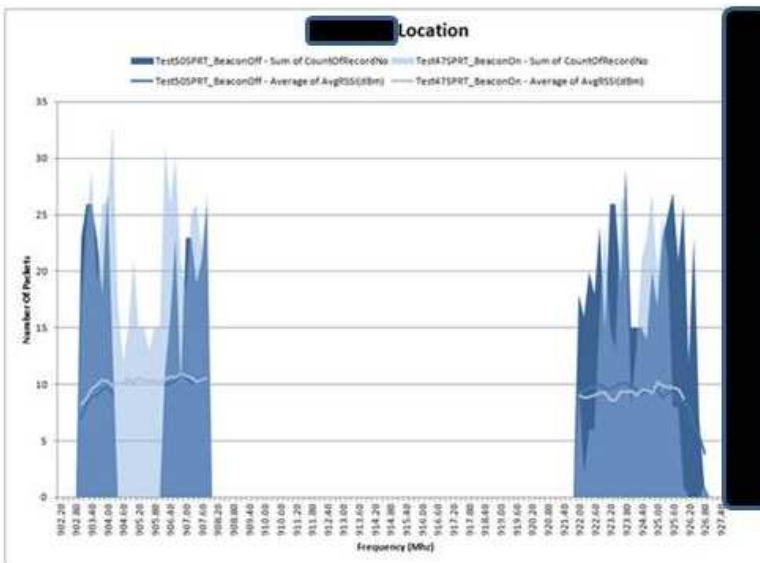
Test Number	Mast Height	Net OFF/ON	EP Loc2->Rx				
			Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd
Test 50	25	OFF	0	2,874	0.00%		0
Test 47	25	ON	0	3,331	0.00%	0	0

This is the decoded packet count for the endpoints at EP Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 50 with the Progeny system off. The light blue are the endpoint packets decoded from Test 47 with the Progeny system on.



Test Number	Mask Height	Net Off/ON	EP Loc 1->RPT->CCU							
			CCU	Pkst	Pkts	2nd	2nd Hop	1st Hop	1st Hop	ERTs
			Pkts Rcvd	Sent/Rcvd RPTR	Sent ERT	PSR %	Delta	PSR %	Delta	ERTs Rcvd
Test 50	25	OFF	888	1,395	2,367	63.7%		58.9%		8
Test 47	25	ON	930	1,661	2,743	56.0%	7.7	60.6%	-1.7	8

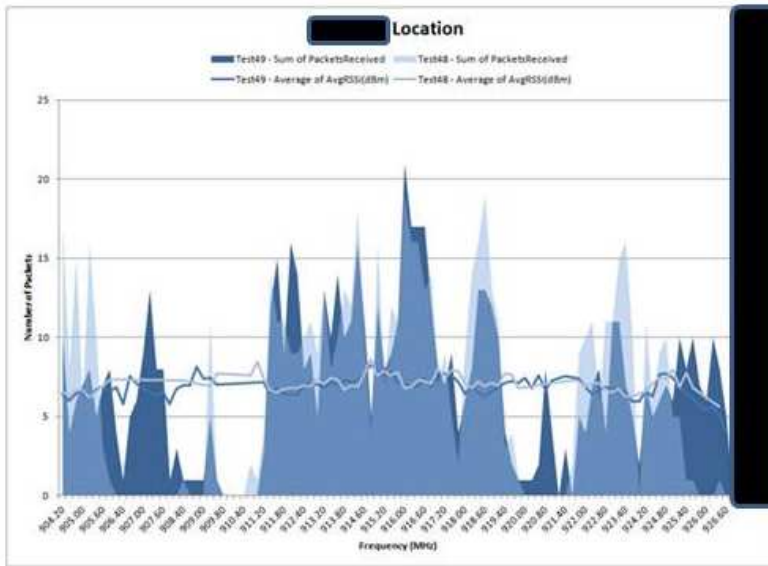
This is the decoded packet count for the endpoints at EP Location 1 retransmitted through the repeater [REDACTED] at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 50 with the Progeny system off. The light blue are the endpoint packets decoded from Test 47 with the Progeny system on.



Test Number	Mask Height	Net Off/ON	EP Loc 2->RPT->CCU							
			CCU	Pkst	Pkts	2nd	2nd Hop	1st Hop	1st Hop	ERTs
			Pkts Rcvd	Sent/Rcvd RPTR	Sent ERT	PSR %	Delta	PSR %	Delta	ERTs Rcvd
Test 50	25	OFF	800	1,195	2,874	66.9%		41.6%		11
Test 47	25	ON	899	1,511	3,331	56.8%	10.1	45.4%	-3.8	11

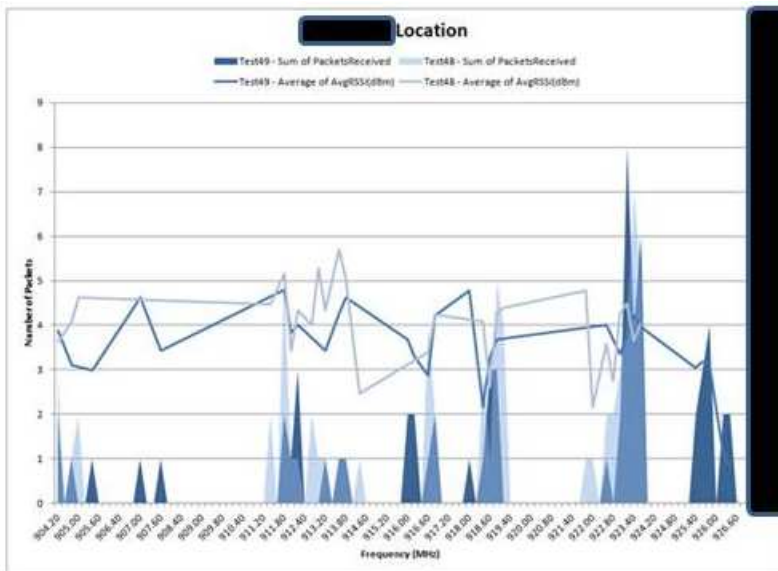
This is the decoded packet count for the endpoints at EP Location 2 retransmitted through the repeater [REDACTED] at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 50 with the Progeny system off. The light blue are the endpoint packets decoded from Test 47 with the Progeny system on.

Test 49 and Test 48 (50 ft. Antenna Ht.)



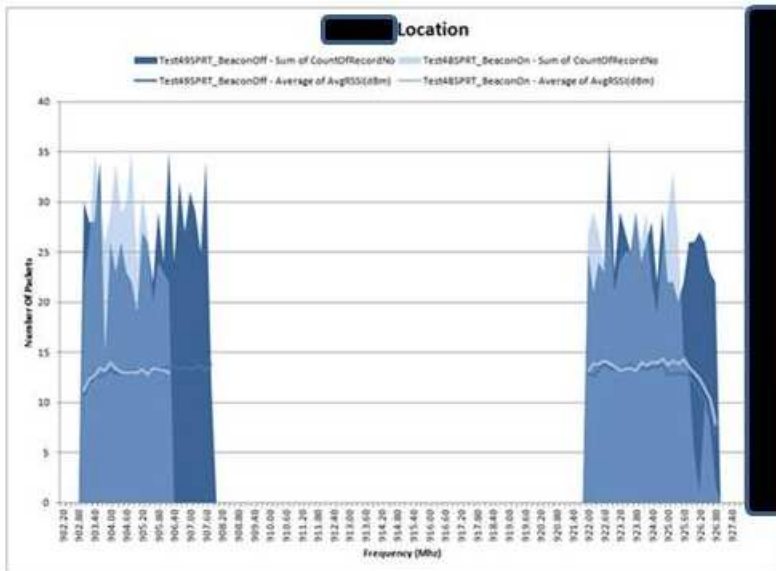
Test Number	Mast Height	Net OFF/ON	EP Loc1->Rx					
			Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd	ERTS Expd
Test 49	50	OFF	703	2,574	27.30%		7	8
Test 48	50	ON	655	2,676	24.50%	2.8	8	8

This is the decoded packet count for the endpoints at EP Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 49 with the Progeny system off. The light blue are the endpoint packets decoded from Test 48 with the Progeny system on.



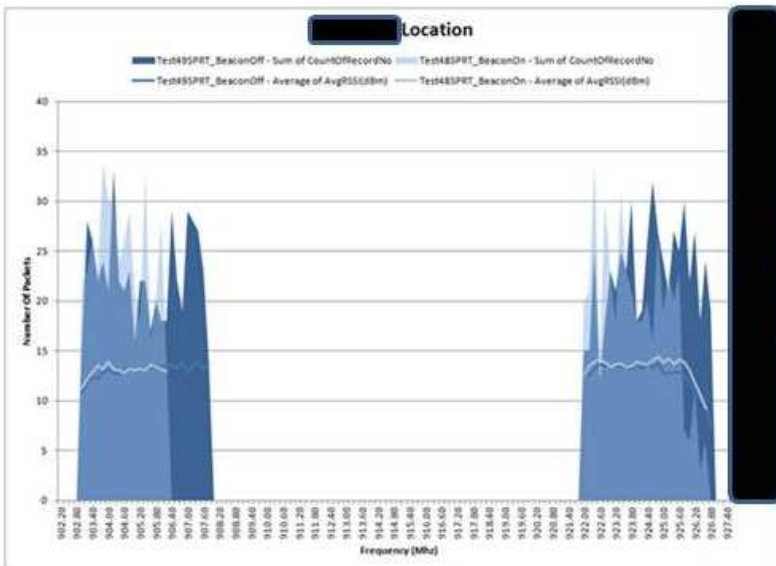
Test Number	Mast Height	Net OFF/ON	EP Loc2->Rx					
			Pkts Rcvd	Pkst Sent	PSR %	PSR Delta	ERTs Rcvd	ERTS Expd
Test 49	50	OFF	64	3,125	2.00%		8	11
Test 48	50	ON	66	3,250	2.00%	0	10	11

This is the decoded packet count for the endpoints at EP Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 49 with the Progeny system off. The light blue are the endpoint packets decoded from Test 48 with the Progeny system on.



Test Number	Mast Height	Net Off/ON	EP Loc1->RPT->CCU								
			CCU	Pkts	Pkts	2nd	2nd Hop	1st Hop	1st Hop	ERTs	ERTs
			Pkts Rcvd	Sent/Rcvd RPTR	Sent ERT	PSR %	Delta	PSR %	Delta	Rcvd	Expd
Test 49	50	OFF	1,278	1,632	2,574	78.3%		63.4%		8	8
Test 48	50	ON	991	1,489	2,677	66.1%	12.2	56.0%	7.4	8	8

This is the decoded packet count for the endpoints at EP Location 1 retransmitted through the repeater 100 at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test49 with the Progeny system off. The light blue are the endpoint packets decoded from Test 48 with the Progeny system on.

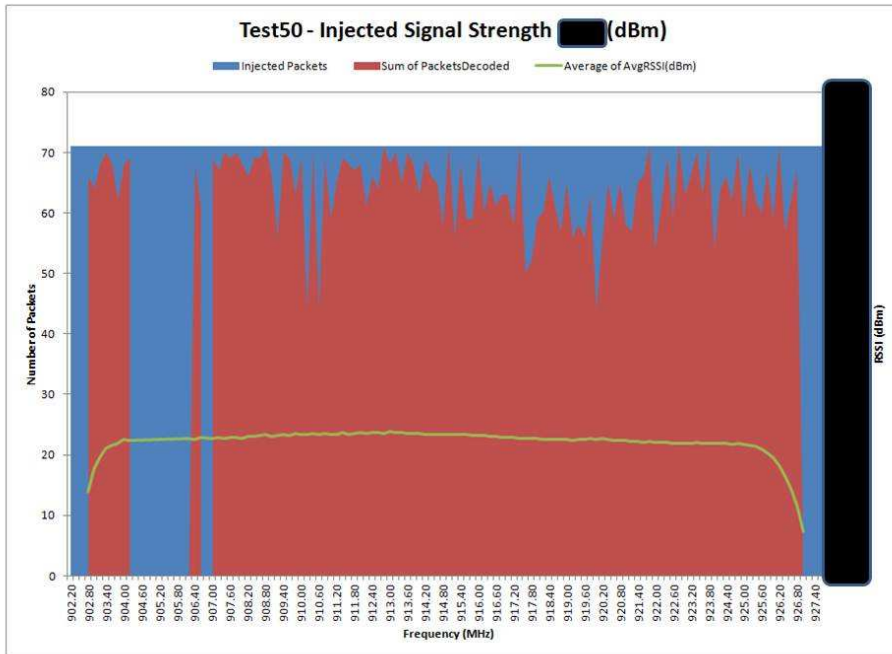


Test Number	Mast Height	Net Off/ ON	EP Loc2->RPT->CCU								
			CCU	Pkts	Pkts	2nd	2nd Hop	1st Hop	1st Hop	ERTs	ERTs
			Pkts Rcvd	Sent/Rcvd RPTR	Sent ERT	PSR %	Delta	PSR %	Delta	Rcvd	Expd
Test 49	50	OFF	1,126	1,410	3,125	79.9%		45.1%		11	11
Test 48	50	ON	870	1,389	3,250	62.2%	17.7	43.0%	2.1	11	11

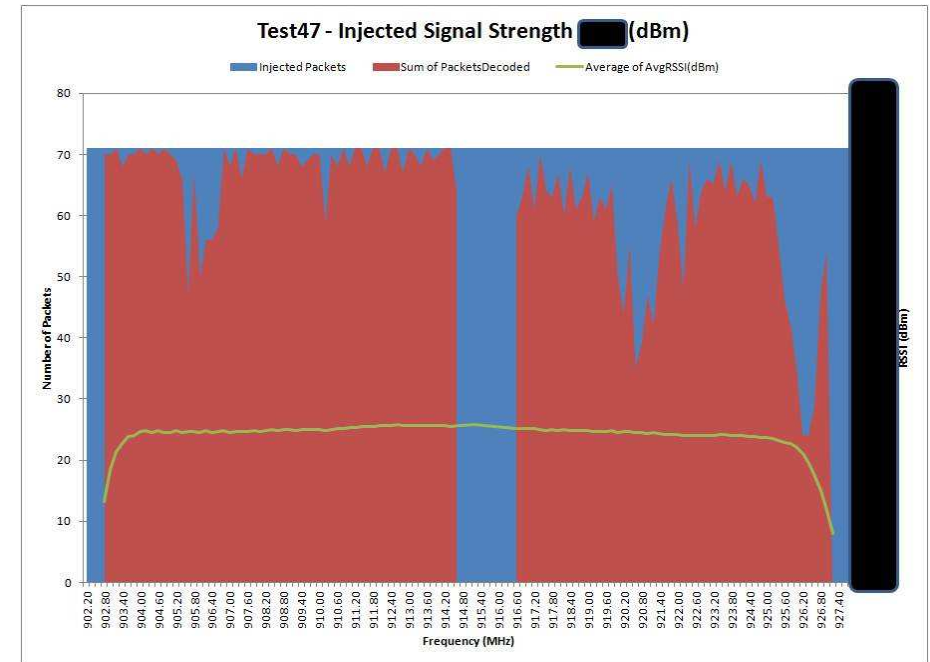
This is the decoded packet count for the endpoints at EP Location 2 retransmitted through the repeater 100 at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 49 with the Progeny system off. The light blue are the endpoint packets decoded from Test 48 with the Progeny system on.

RF/PER Tests Showing Packet Success Rate

Test 50 and Test 47 (25 ft. Antenna Ht.) Packet Error Test Results

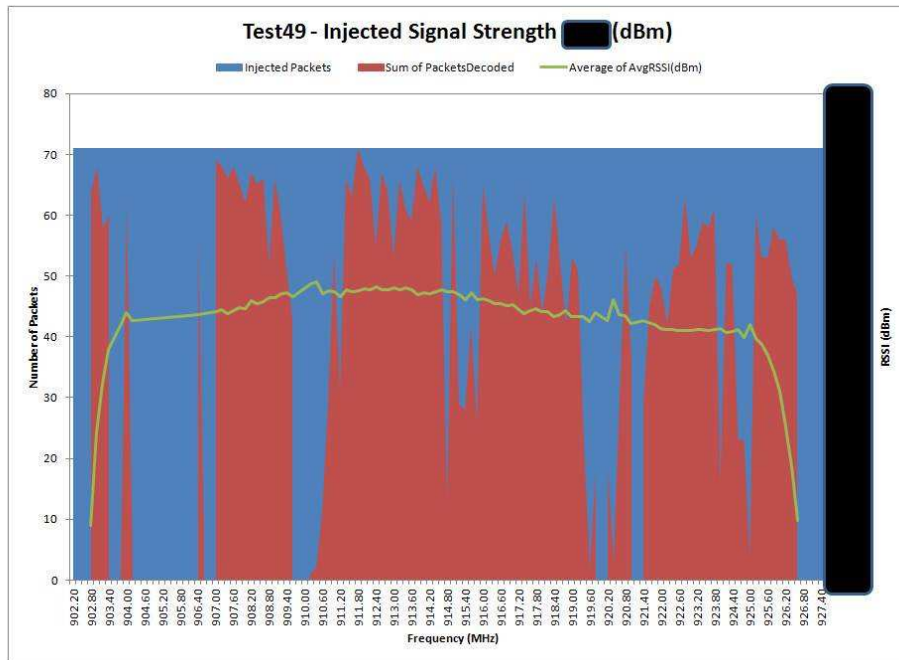


Test 50 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.

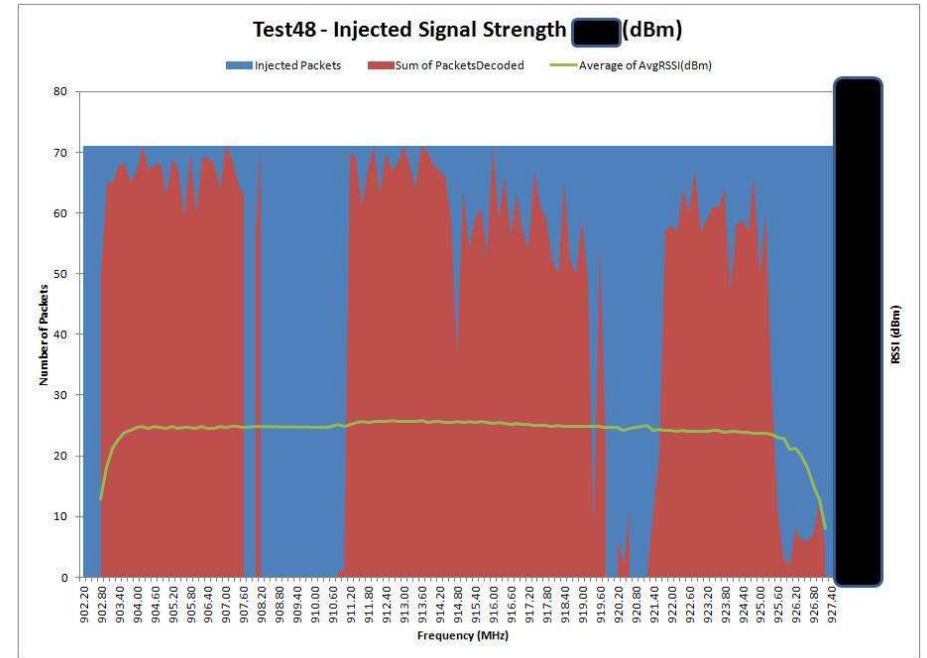


Test 47 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 49 and Test 48 (50 ft. Antenna Ht.)
 Packet Error Test Results



Test 49 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



Test 48 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Configuration 2 Location 2 Data: In attached spreadsheet - [Location2repeaterreads.xlsx](#)

Location 3: Urban (colocation and close proximity)



Distances to the 3 closest beacons are: [REDACTED].

Packet Error Test	Mast Height	Progeny System Status	Endpoint Location 1	Endpoint Location 2	Endpoint Channel Plan	Repeater Location	Repeater Channel Plan	Test ID
All Channels	25 ft	OFF	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 44
	50 ft	OFF	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 43
	25 ft	ON	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 45
	50 ft	ON	EP Loc 1	EP Loc 2	100	RPT Loc 3	50	Test 46

System Test: ERT to CCU Direct Link Results Location 3

EP Loc 1 = [REDACTED] ERTs, EP Loc 2 = [REDACTED] ERTs, Rx = CCU

Location 3				DIRECT LINK FROM ERTs TO CCU											
Test Number	Mast Height	Net OFF/ON	Duration	EP Loc1->Rx						EP Loc2->Rx					
				Pkts Rcvd	Pkst Sent	PSR %	PSR Delta %	ERTs Rcvd	ERTS Expd	Pkts Rcvd	Pkst Sent	PSR %	PSR Delta %	ERTs Rcvd	ERTS Expd
Test44	25	OFF	89:56	697	2,518	27.7%		8	8	0	3,058	0.0%		0	11
Test45	25	ON	89:57	492	2,519	19.5%	8.1%	8	8	0	3,058	0.0%	0.0%	0	11
Test43	50	OFF	98:14	1,377	2,751	50.1%		8	8	31	3,340	0.9%		2	11
Test46	50	ON	89:55	602	2,518	23.9%	26.2%	8	8	8	3,057	0.3%	0.7%	2	11

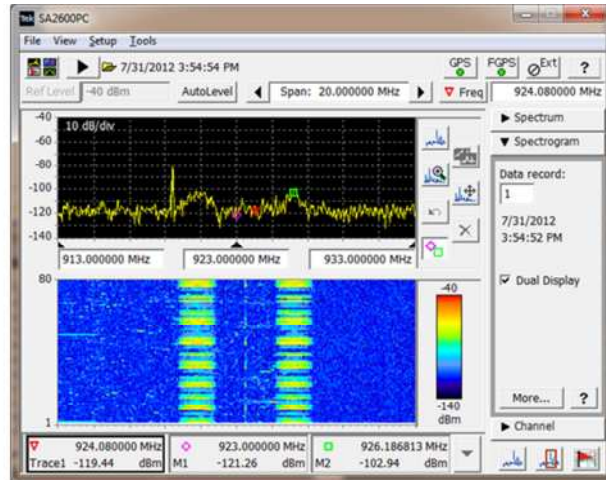
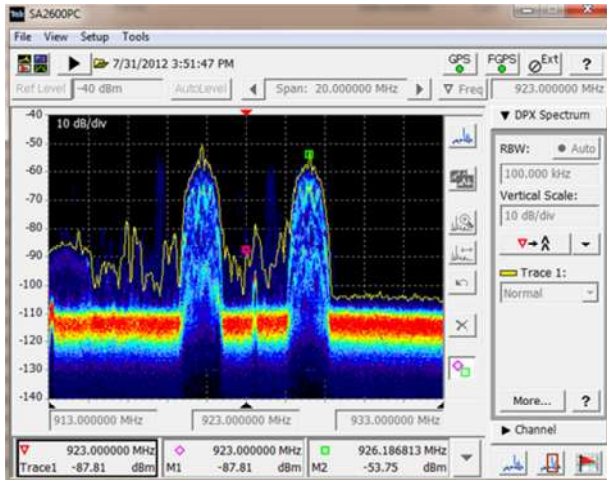
Location 3				Endpoint to Repeater to CCU								
Test Number	Mast Height	Net OFF/ON	Duration	EP Loc1->RPT->CCU								
				CCU Pkts Rcvd	Pkst Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd	ERTS Expd
Test44	25	OFF	89:56	538	1,510	2,518	35.6%		60.0%		8	8
Test45	25	ON	89:57	344	1,387	2,519	24.8%	10.8	55.1%	4.9	8	8
Test43	50	OFF	98:14	1,119	1,637	2,751	68.4%		59.5%		8	8
Test46	50	ON	89:55	593	1,284	2,518	46.2%	22.2	51.0%	8.5	8	8

Location 3				Endpoint to Repeater to CCU								
Test Number	Mast Height	Net OFF/ON	Duration	EP Loc2->RPT->CCU								
				CCU Pkts Rcvd	Pkst Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd	ERTS Expd
Test44	25	OFF	89:56	822	2,484	3,058	33.1%		81.2%		11	11
Test45	25	ON	89:57	521	2,195	3,058	23.7%	9.4	71.8%	9.5	11	11
Test43	50	OFF	98:14	1,858	2,745	3,340	67.7%		82.2%		11	11
Test46	50	ON	89:55	1,025	2,203	3,057	46.5%	21.2	72.1%	10.1	11	11

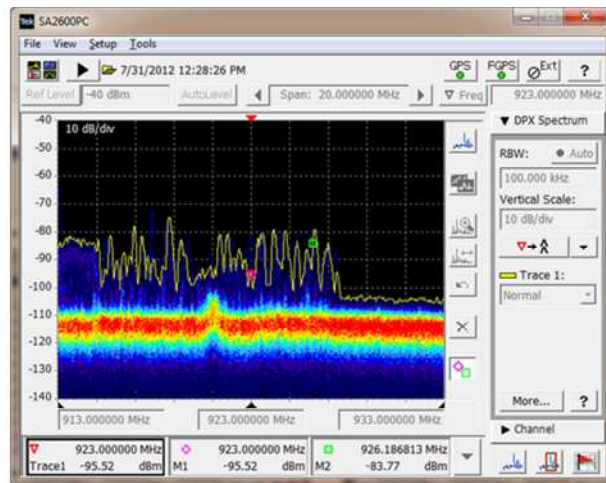
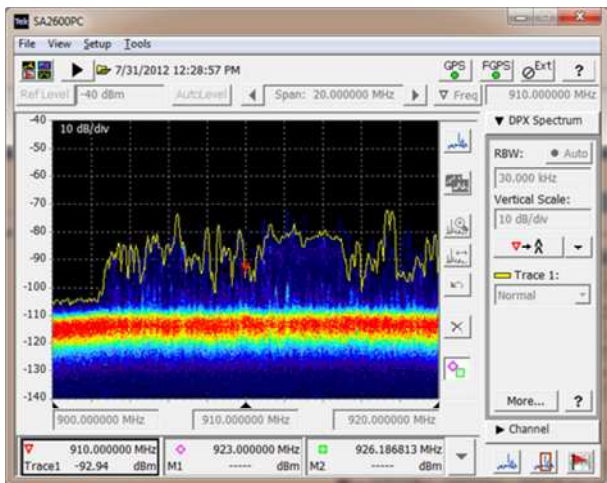
Spectrum Plots and Performance Across Channels

Note: Different plots have reference levels. This limited dynamic range of the spectrum analyzer will effects the overall noise floor measurements.

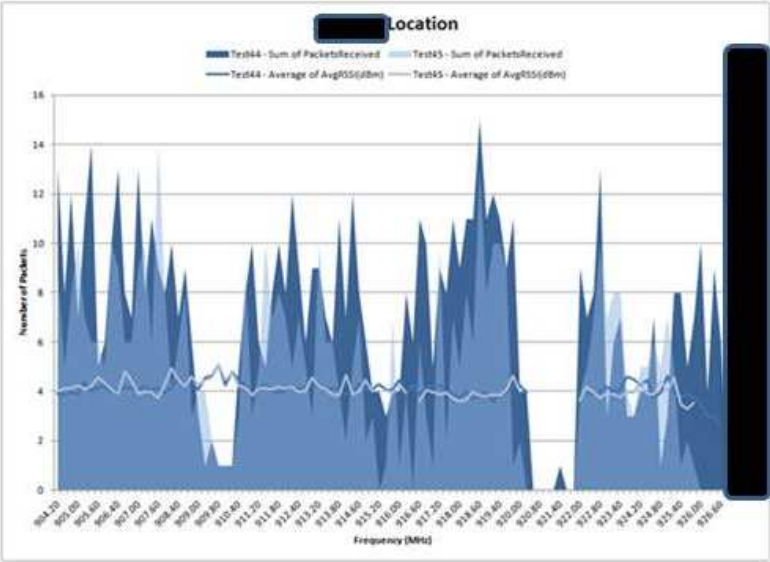
Progeny System On



Progeny System Off

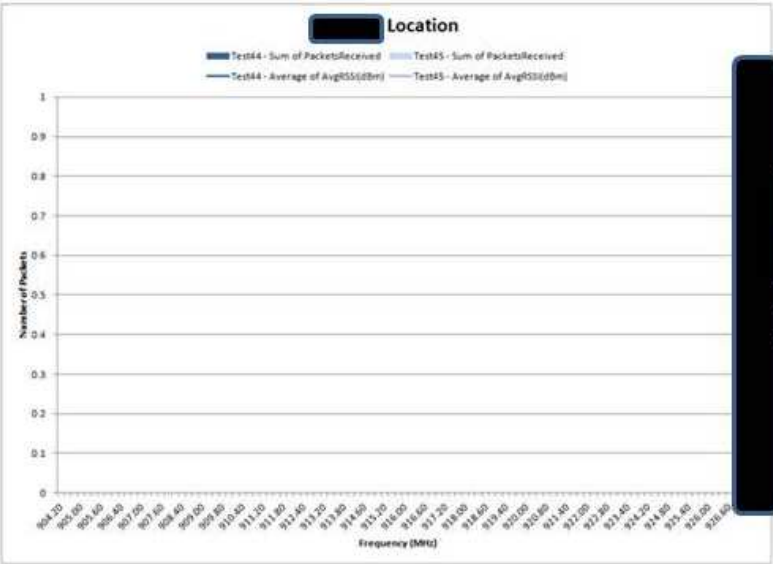


Test 44 and Test 45 (25 ft. Antenna Ht.)



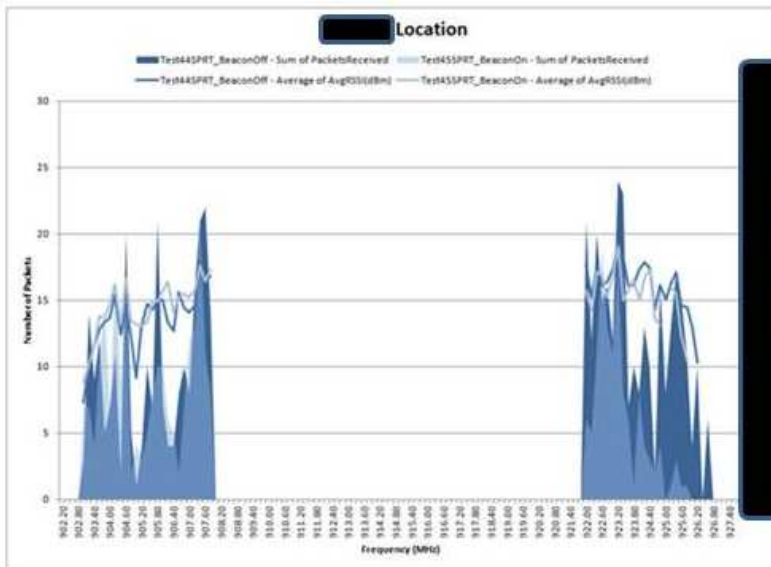
Test Number	Mast Height	Net OFF/ON	EP Loc1->Rx				
			Pkts Rcvd	Pkst Sent	PSR %	PSR Delta %	ERTs Rcvd
Test 44	25	OFF	697	2,518	27.70%		8
Test 45	25	ON	492	2,519	19.50%	0.081	8

This is the decoded packet count for the endpoints at EP Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 44 with the Progeny system off. The light blue are the endpoint packets decoded from Test 45 with the Progeny system on.



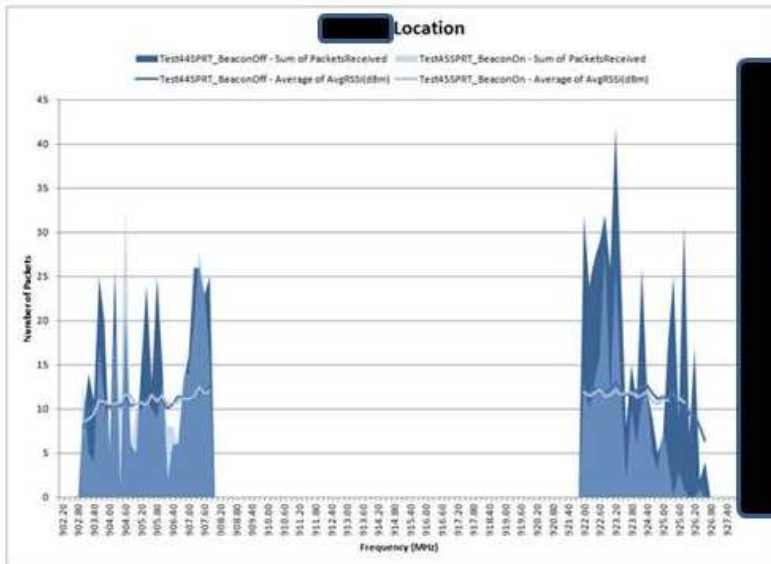
Test Number	Mast Height	Net OFF/ON	EP Loc2->Rx				
			Pkts Rcvd	Pkst Sent	PSR %	PSR Delta %	ERTs Rcvd
Test 44	25	OFF	0	3,058	0.00%		0
Test 45	25	ON	0	3,058	0.00%	0	0

This is the decoded packet count for the endpoints at EP Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 44 with the Progeny system off. The light blue are the endpoint packets decoded from Test 45 with the Progeny system on.



Test Number	Mast Height	Net Off/ ON	EP Loc1->RPT->CCU							
			CCU Pkts Rcvd	Pkts Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERT's Rcvd
Test 44	25	OFF	538	1,510	2,518	35.6%		60.0%		8
Test 45	25	ON	344	1,387	2,519	24.8%	10.8	55.1%	4.9	8

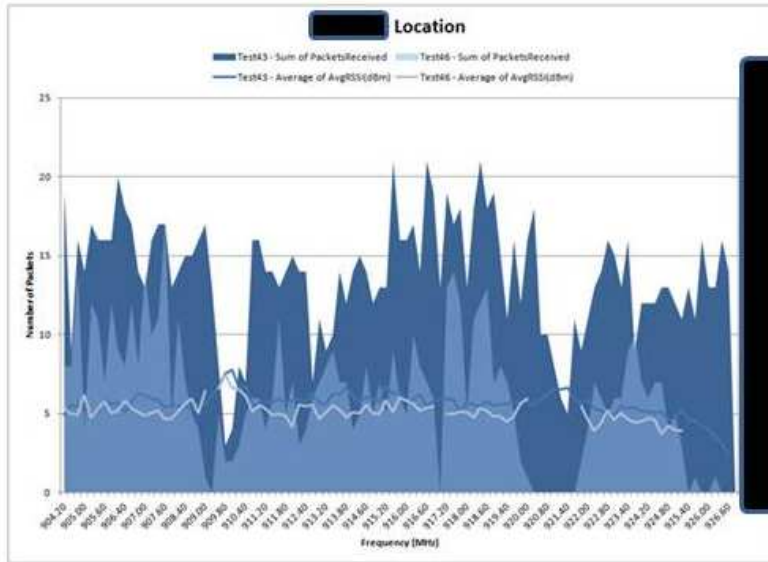
This is the decoded packet count for the endpoints at EP Location 1 retransmitted through the repeater [REDACTED] at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 44 with the Progeny system off. The light blue are the endpoint packets decoded from Test 45 with the Progeny system on.



Test Number	Mast Height	Net Off/ ON	EP Loc2->RPT->CCU							
			CCU Pkts Rcvd	Pkts Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERT's Rcvd
Test 44	25	OFF	822	2,484	3,098	33.1%		81.2%		11
Test 45	25	ON	521	2,195	3,098	23.7%	9.4	71.8%	9.5	11

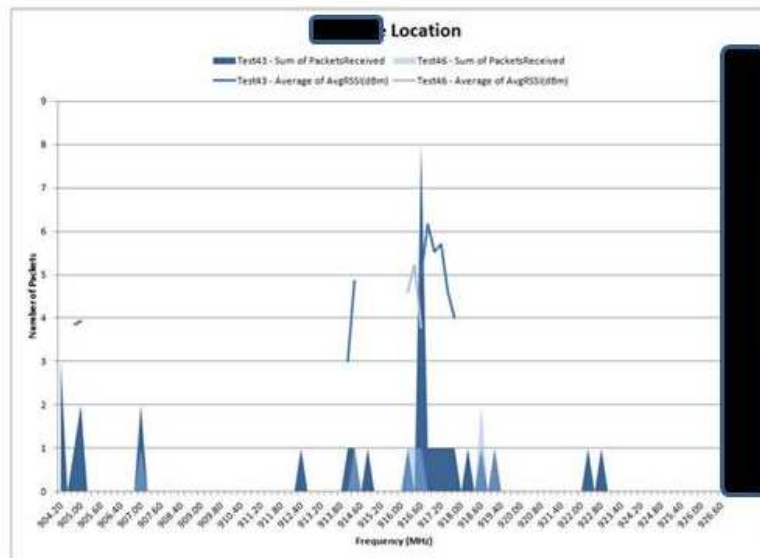
This is the decoded packet count for the endpoints at EP Location 2 retransmitted through the repeater [REDACTED] at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test44 with the Progeny system off. The light blue are the endpoint packets decoded from Test 45 with the Progeny system on.

Test 43 and Test 46 (50 ft. Antenna Ht.)



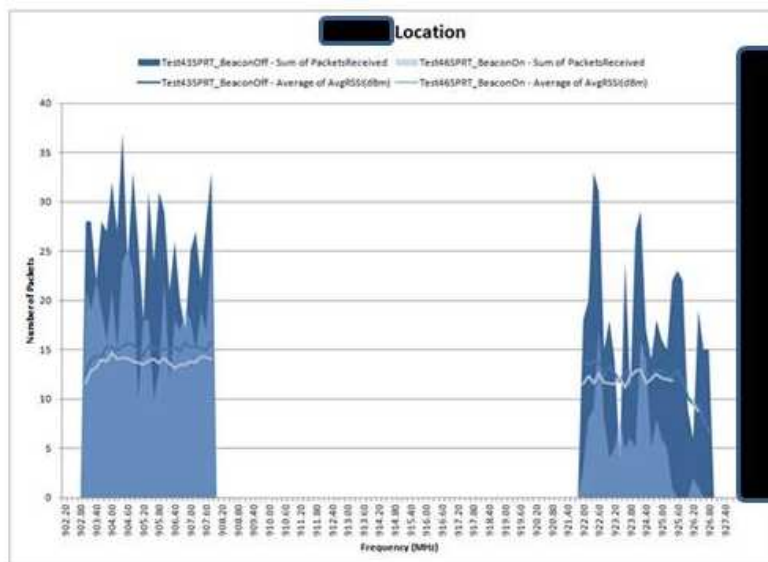
Test Number	Mast Height	Net OFF/ON	EP Loc1->Rx					
			Pkts Rcvd	Pkts Sent	PSR %	PSR Detla %	ERTs Rcvd	ERTS Expd
Test 43	50	OFF	1,377	2,751	50.10%		8	8
Test 46	50	ON	602	2,518	23.90%	0.262	8	8

This is the decoded packet count for the endpoints at EP Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 43 with the Progeny system off. The light blue are the endpoint packets decoded from Test 46 with the Progeny system on.



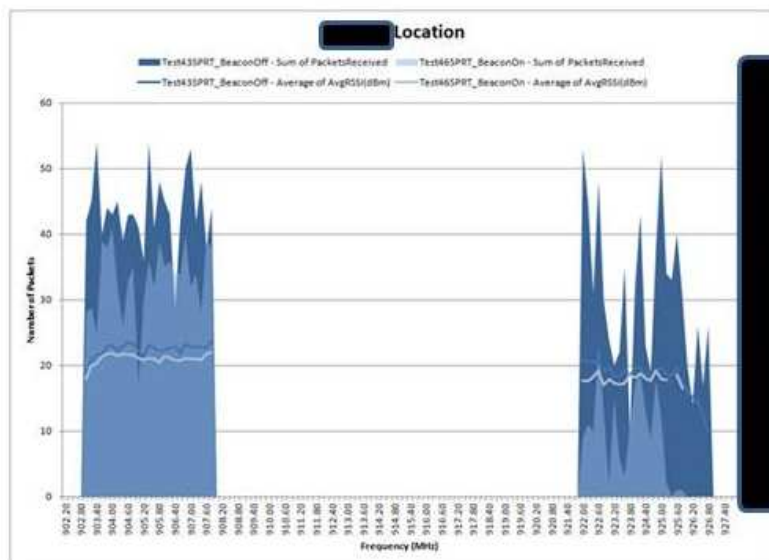
Test Number	Mast Height	Net OFF/ON	EP Loc2->Rx					
			Pkts Rcvd	Pkts Sent	PSR %	PSR Detla %	ERTs Rcvd	ERTS Expd
Test 43	50	OFF	31	3,340	0.90%		2	11
Test 46	50	ON	8	3,057	0.30%	0.007	2	11

This is the decoded packet count for the endpoints at EP Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 43 with the Progeny system off. The light blue are the endpoint packets decoded from Test 46 with the Progeny system on.



Test Number	Mask Height	Net Off/ ON	EP Loc1->RPT->CCU							
			CCU Pkts Rcvd	Pkts Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd
										ERTs Expd
Test 43	50	OFF	1,119	1,637	2,751	68.4%		59.5%		8
Test 46	50	ON	593	1,284	2,518	46.2%	22.2	51.0%	8.5	8

This is the decoded packet count for the endpoints at EP Location 1 retransmitted through the repeater [REDACTED] at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test43 with the Progeny system off. The light blue are the endpoint packets decoded from Test 46 with the Progeny system on.

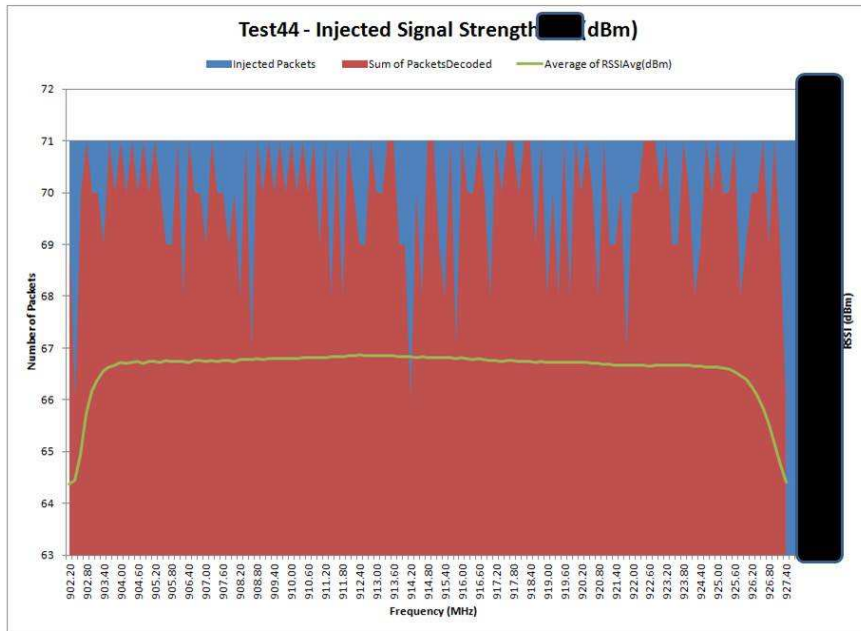


Test Number	Mask Height	Net Off/ ON	EP Loc2->RPT->CCU							
			CCU Pkts Rcvd	Pkts Sent/Rcvd RPTR	Pkts Sent ERT	2nd Hop PSR %	2nd Hop PSR Delta	1st Hop PSR %	1st Hop PSR Delta	ERTs Rcvd
										ERTs Expd
Test 43	50	OFF	1,858	2,745	3,340	67.7%		82.2%		11
Test 46	50	ON	1,025	2,203	3,057	46.5%	21.2	72.1%	10.1	11

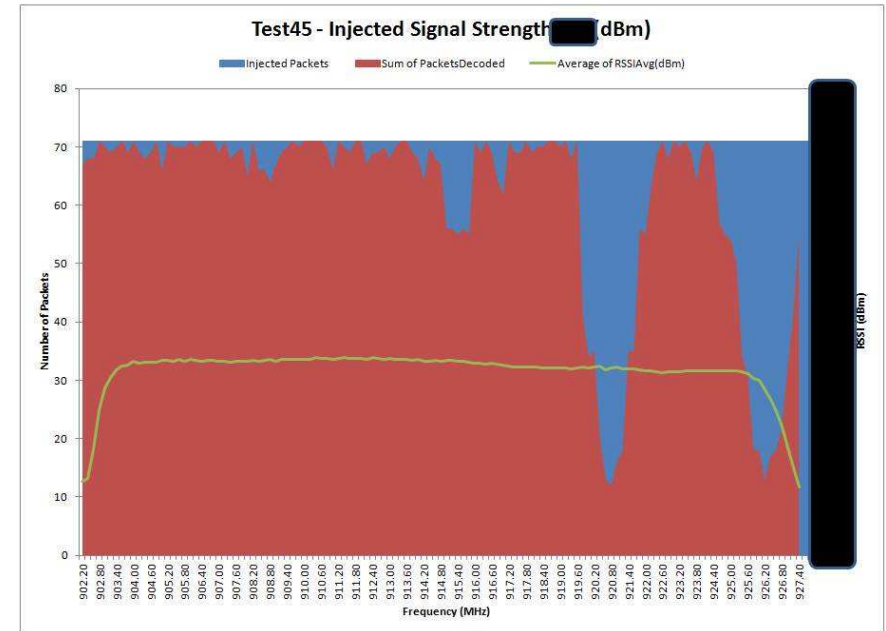
This is the decoded packet count for the endpoints at EP Location 2 retransmitted through the repeater [REDACTED] at RPT Location 3. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 43 with the Progeny system off. The light blue are the endpoint packets decoded from Test 46 with the Progeny system on.

RF/PER Tests Showing Packet Success Rate

Test 44 and Test 45 (25 ft. Antenna Ht.) Packet Error Test Results

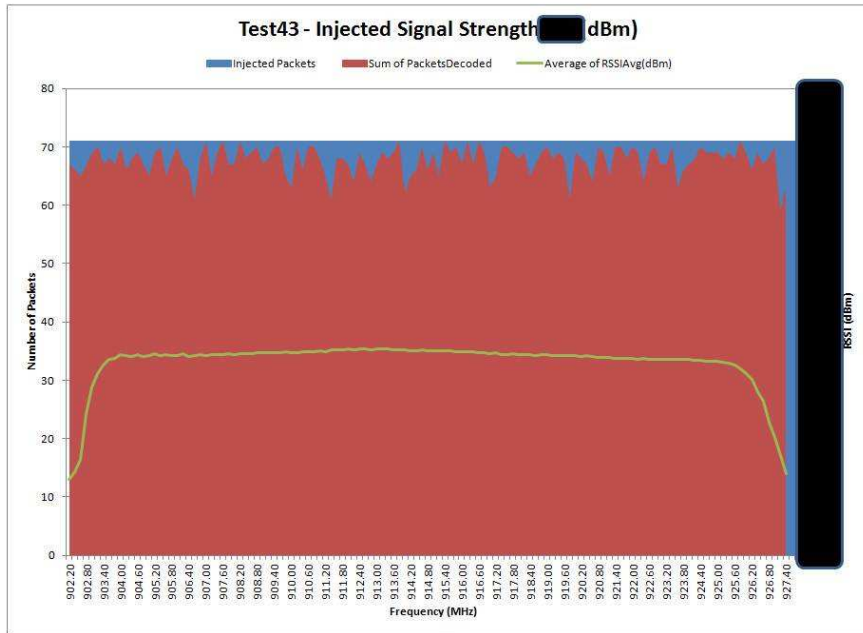


Test 44 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.

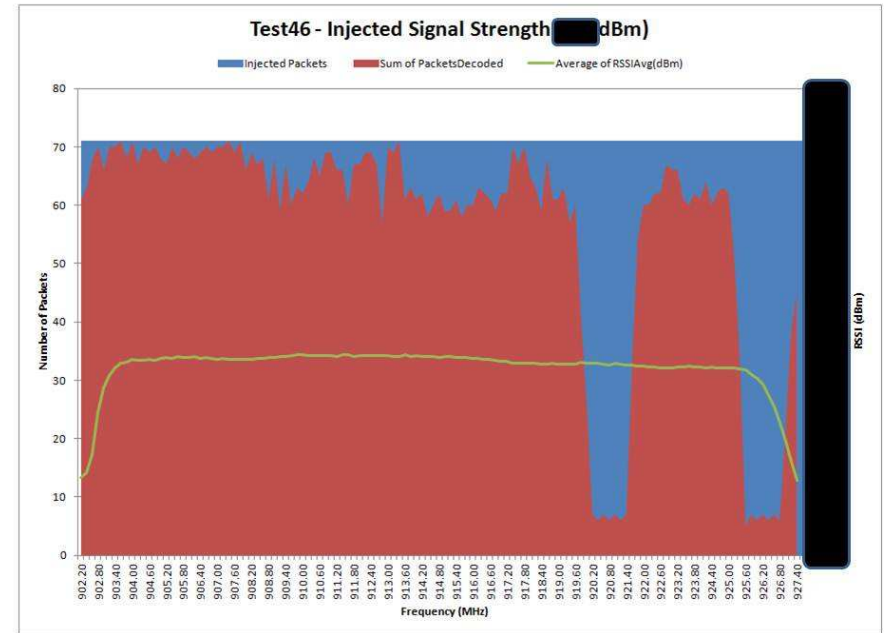


Test 45 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 43 and Test 46 (50 ft. Antenna Ht.)
Packet Error Test Results



Test 43 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



Test 46 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Configuration 2 Location 3 Data: In attached spreadsheet - Location3repeaterreads.xlsx

Appendix 1 – Preliminary Test Data

Prior to initiating formal testing, the two parties completed preliminary testing in two of the three locations with a subset of the equipment configurations. These preliminary tests utilized a smaller number of endpoints (6 vs 18) and endpoint locations, and the endpoints were programmed with a 50 channel transmission plan in the upper portion of the band to establish co-channel operation with the two spectrum segments used by the Progeny M-LMS beacons. The Itron endpoints are also capable of operating in a 50 channel transmission plan that does not overlap either of the spectrum segments used by the Progeny beacons, but the parties felt that non co-channel operation was unlikely to exhibit any impact, therefore it would not be instructive to test such a configuration. For the formal testing, the parties agreed to test endpoints programmed with a 100 channel transmission plan which utilized the entire spectrum band, both co-channel and non co-channel. For completeness of the record, the results from the preliminary testing with a 50 channel transmission plan in the upper portion of the band are included below.

Test setup Configuration 1 Test Results (ERT to CCU)

Location 1: Suburban (close proximity, but no colocation)



Distances to the 3 closest beacons are: [REDACTED]x

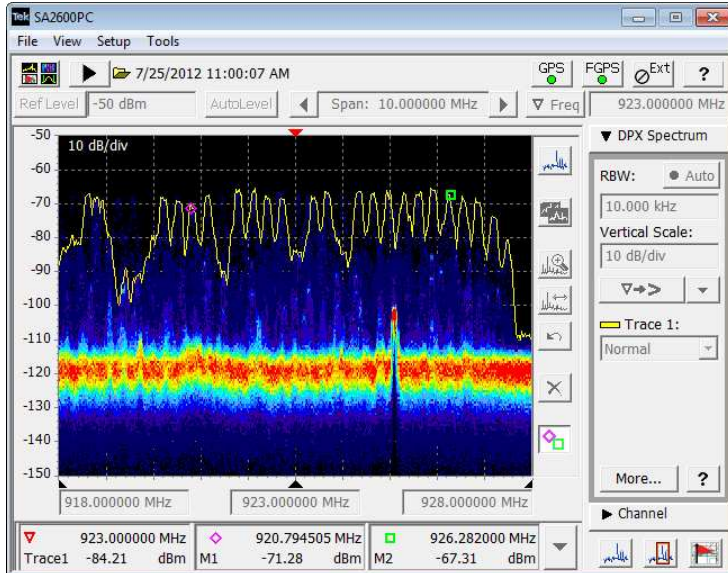
System Test: ERT to CCU Results Location 1 50 Channels

			ERT Group EP Loc 1						ERT Group EP Loc 2					
Test Number	Mast Height	Net OFF/ON	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test7	11 ft	OFF							733	1362	53.8		6	6
Test6	11 ft	ON							464	936	49.6	4.2	6	6
Test8	25 ft	OFF							571	936	61.0		6	6
Test5	25 ft	ON							400	930	43.0	18	6	6
Test2	50 ft	OFF							322	936	34.4		6	6
Test4	50 ft	ON							233	936	24.9	9.51	6	6

Spectrum Plots and Performance Across Channels

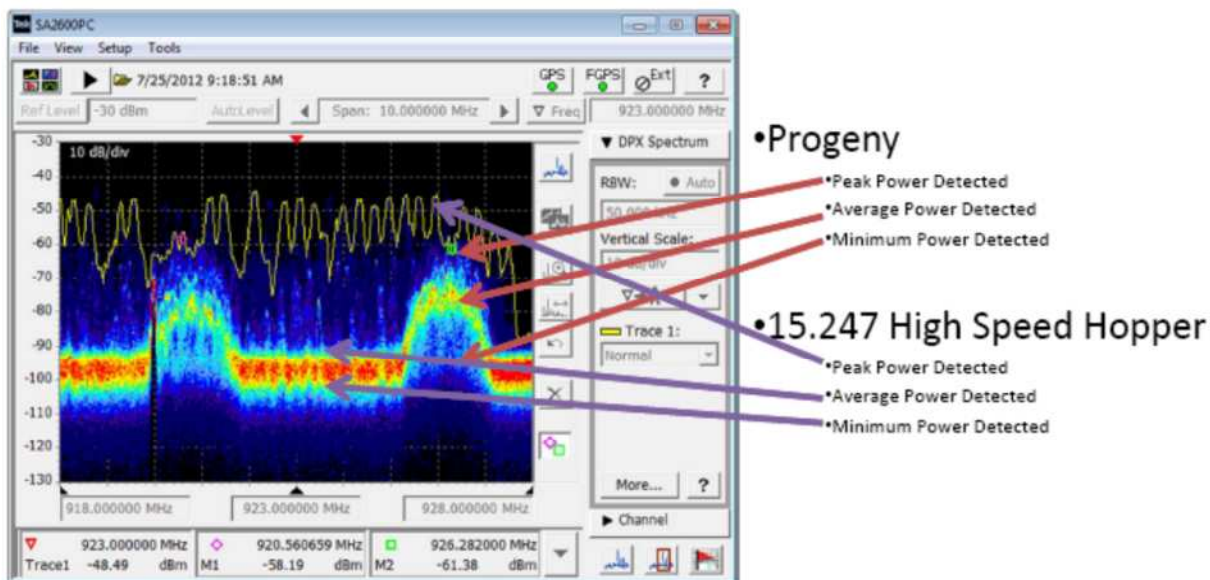
Progeny System Off

Note: Different plots have reference levels. This limited dynamic range of the spectrum analyzer will effect the overall noise floor measurements.

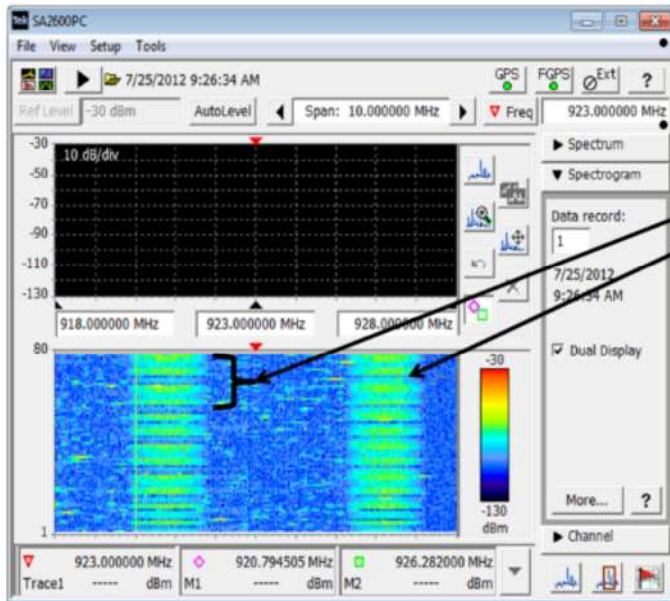


Progeny System On

**Tektronix SA 2600 operating in DSX mode
With Band Pass filter and 15 dB amplifier**



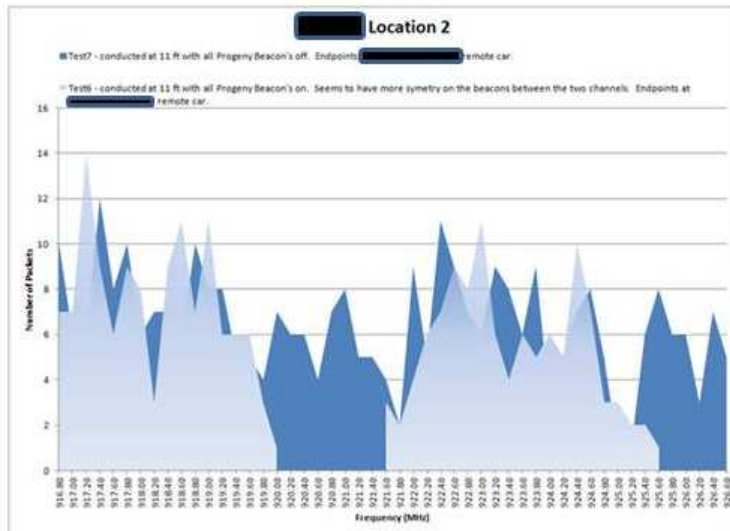
**Tektronix SA 2600 operating in DSX /waterfall mode
With Band Pass filter and 15 dB amplifier**



Progeny System Beacon Timing

- 100 ms time slots per beacon
- Approximately 2 seconds
- 100 ms time gap

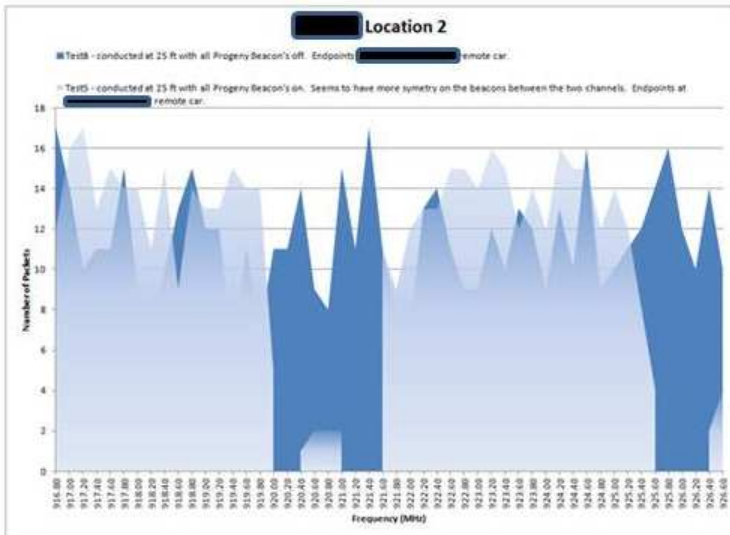
Test 7 and Test 6 (11 ft Antenna Ht.)



[redacted] ERT group EP Loc 2								
Test Number	Mast Height	Net On/Off	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 7	11 ft	Off	322	936	34.4		6	6
Test 6	11 ft	On	233	936	24.9	9.5	6	6

This is the decoded packet count for the endpoints at Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 7 with the Progeny system off. The light blue are the endpoint packets decoded from Test 6 with the Progeny system on.

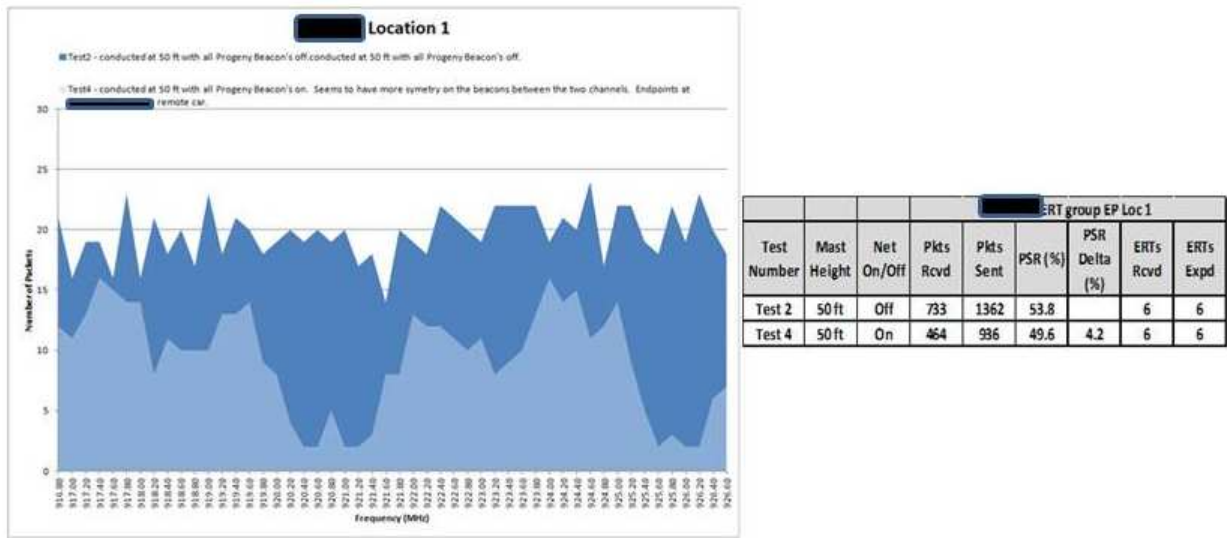
Test 8 and Test 5 (25 ft. Antenna Ht.)



[redacted] ERT group EP Loc 2								
Test Number	Mast Height	Net On/Off	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 8	25 ft	Off	571	936	61.0		6	6
Test 5	25 ft	On	400	930	43.0	17.994	6	6

This is the decoded packet count for the endpoints at Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 8 with the Progeny system off. The light blue are the endpoint packets decoded from Test 5 with the Progeny system on.

Test 2 and Test 4 (50 ft. Antenna Ht.)

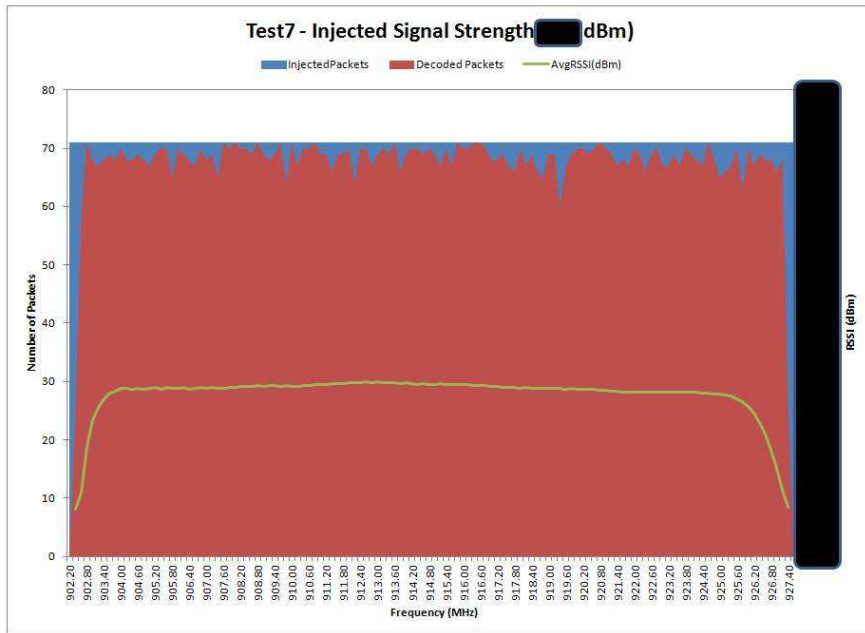


This is the decoded packet count for the endpoints at Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 2with the Progeny system off. The light blue are the endpoint packets decoded from Test 4 with the Progeny system on.

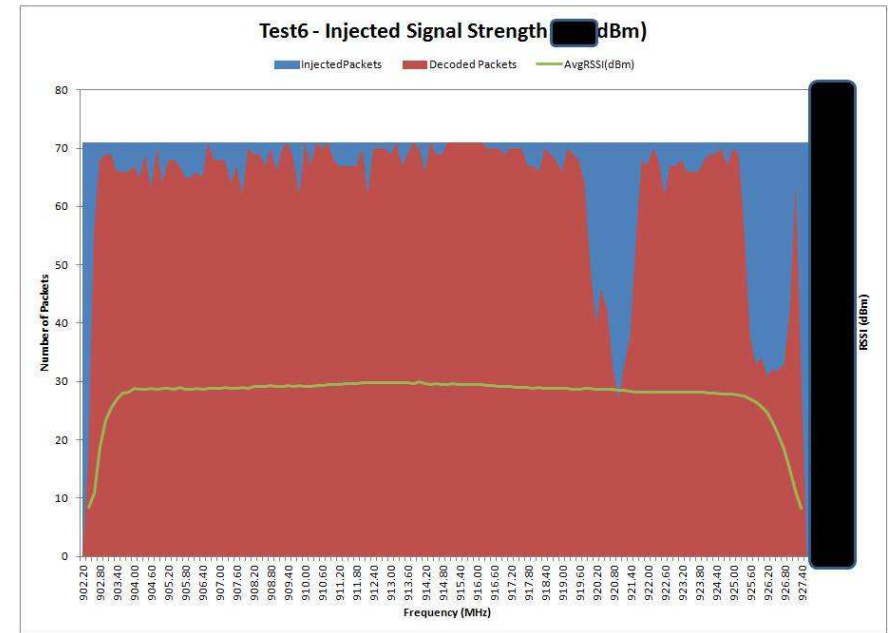
RF/PER Tests Showing Packet Success Rate

Test 7 and Test 6 (11 ft Antenna Ht.)

Packet Error Test Results



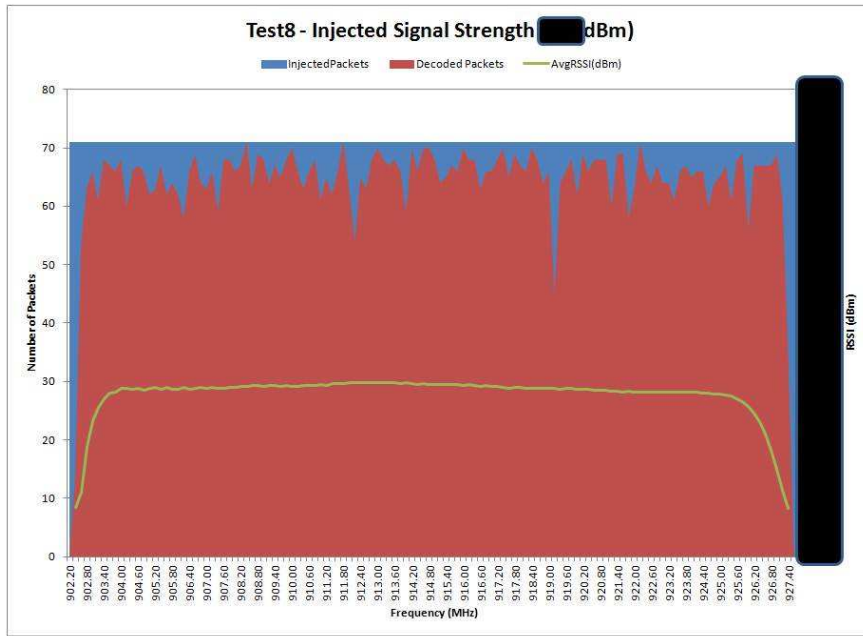
Test 7 with the antenna height at 11 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



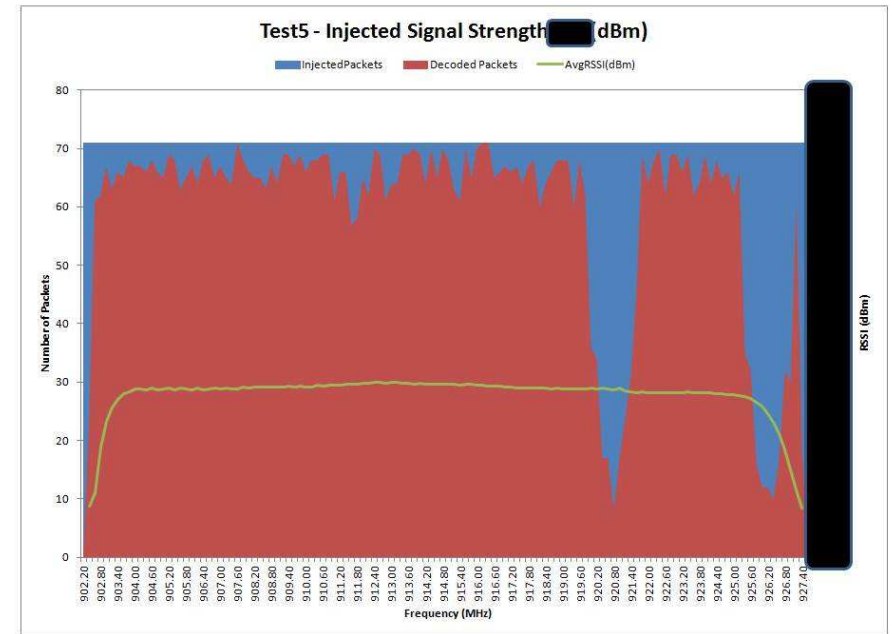
Test 6 with the antenna height at 11 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 8 and Test 5 (25 ft. Antenna Ht.)

Packet Error Test Results



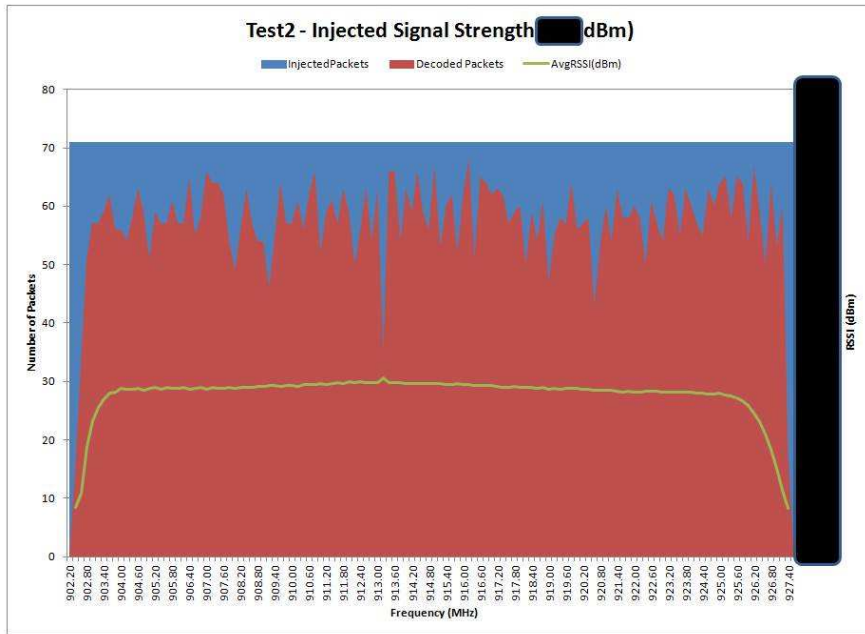
Test 8 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



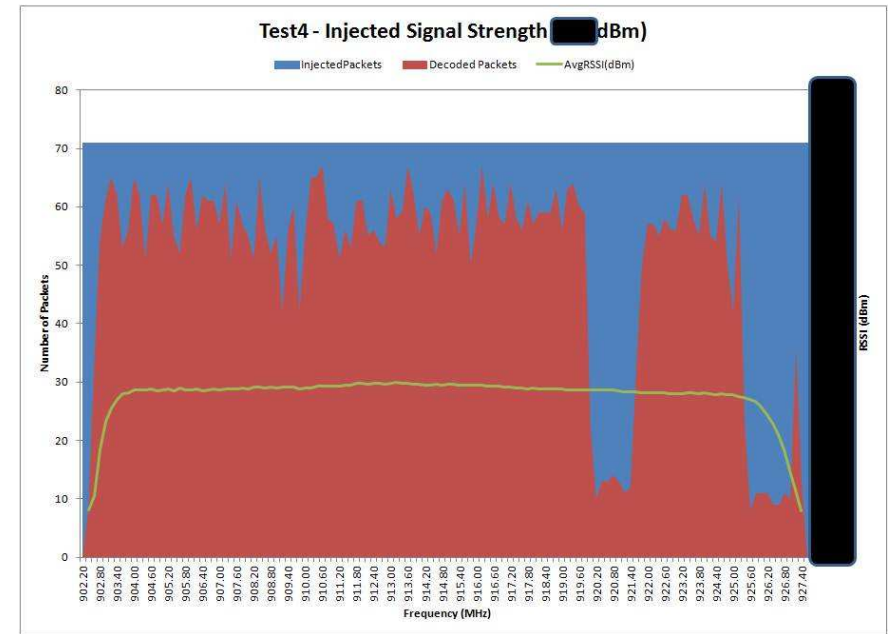
Test 5 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 2 and Test 4 (50 ft. Antenna Ht.)

Packet Error Test Results



Test 2 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



Test 4 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Location 2: Suburban (no close proximity and no colocation)



Distances to the 3 closest beacons are: [REDACTED]

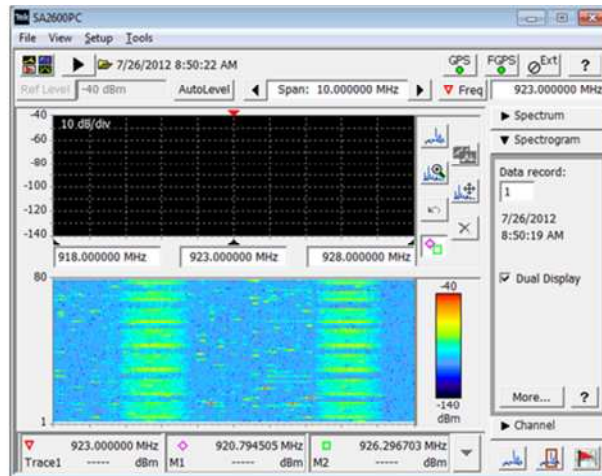
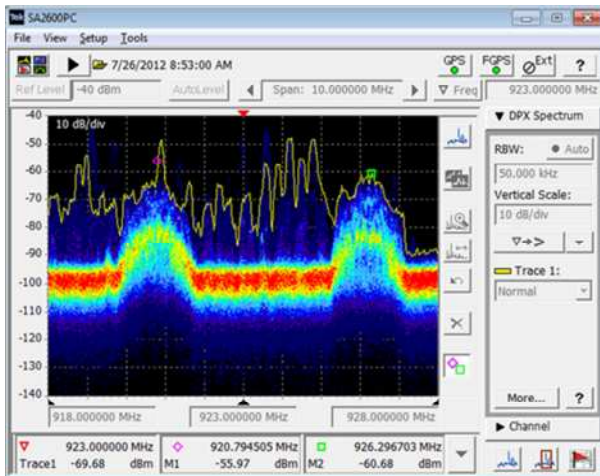
System Test: ERT to CCU Results Location 2 50 Channels

Test Number	Mast Height	Net OFF/ON	[REDACTED] ERT Group EP Location 1						[REDACTED] ERT Group EP Location 4					
			Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test14	11 ft	OFF	447	465	96.1		3	3	260	465	55.9		3	3
Test15	11 ft	ON	438	468	93.6	2.5	3	3	213	468	45.5	10.4	3	3
Test12	25 ft	OFF	421	465	90.5		3	3	215	465	46.2		3	3
Test11	25 ft	ON	332	468	70.9	19.6	3	3	163	468	34.8	11.4	3	3
Test13	50 ft	OFF	406	465	87.3		3	3	61	465	13.1		2	3
Test10	50 ft	ON	391	465	84.1	3.2	3	3	29	465	6.2	6.88	2	3

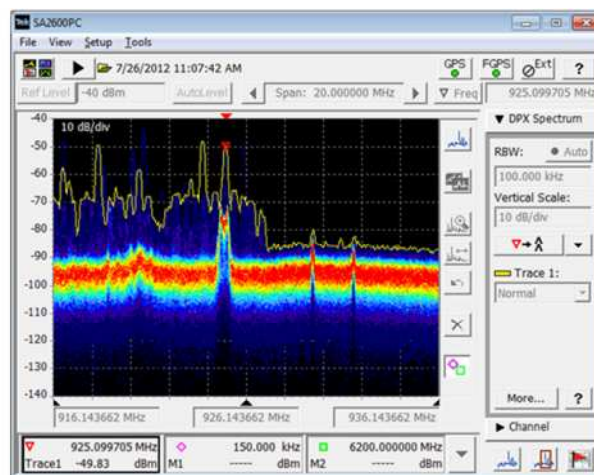
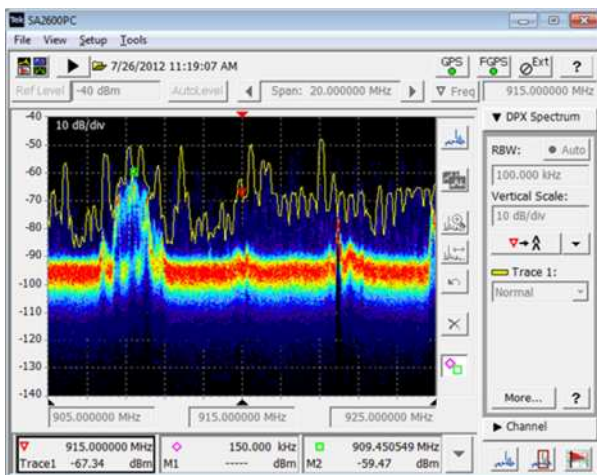
Spectrum Plots and Performance Across Channels

Note: Different plots have reference levels. This limited dynamic range of the spectrum analyzer will effect the overall noise floor measurements.

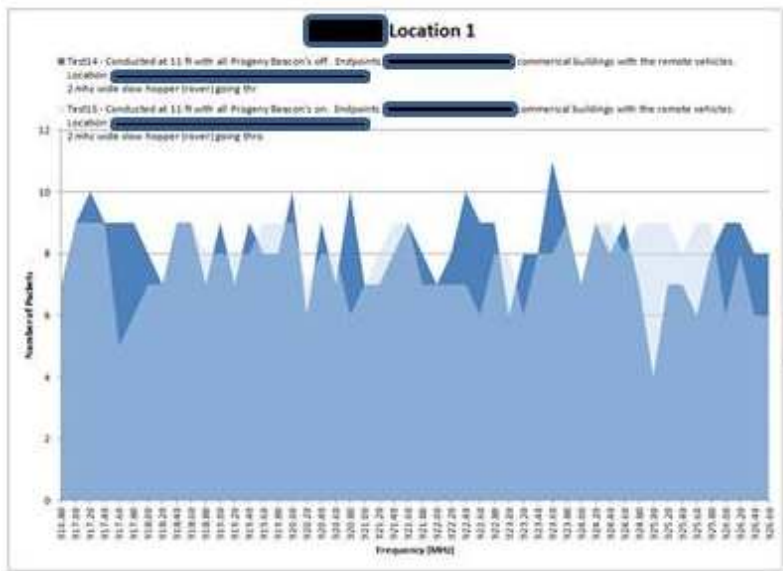
Progeny System On



Progeny System Off

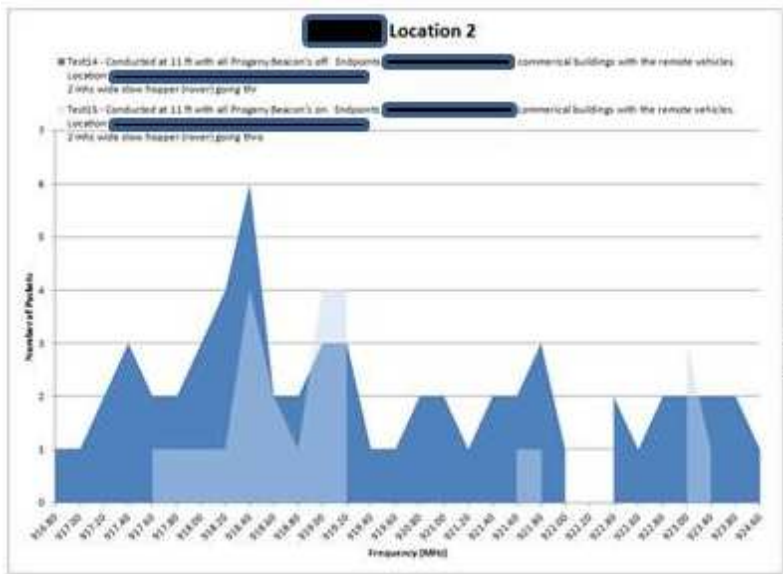


Test 14 and Test 15 (11 ft Antenna Ht.)



ERT group EP Loc 1							
Test Number	Mast Height	Net On/Off	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd
Test 14	11 ft	Off	406	465	87.3		3
Test 15	11 ft	On	391	465	84.1	3.2	3

This is the decoded packet count for the endpoints at Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 14 with the Progeny system off. The light blue are the endpoint packets decoded from Test 15 with the Progeny system



ERT group EP Loc 2							
Test Number	Mast Height	Net On/Off	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd
Test 14	11 ft	Off	61	465	13.1		2
Test 15	11 ft	On	29	465	6.2	6.9	2

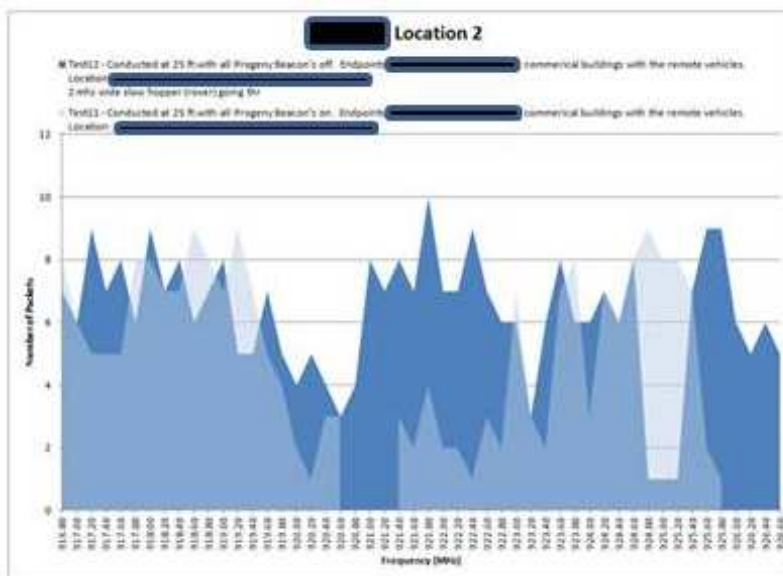
This is the decoded packet count for the endpoints at Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 14 with the Progeny system off. The light blue are the endpoint packets decoded from Test 15 with the Progeny system on.

Test 12 and Test 11 (25 ft. Antenna Ht.)



ERT group EP Loc 1								
Test Number	Mast Height	Net On/Off	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test12	25 ft	Off	421	465	90.5		3	3
Test11	25 ft	On	332	468	70.9	19.6	3	3

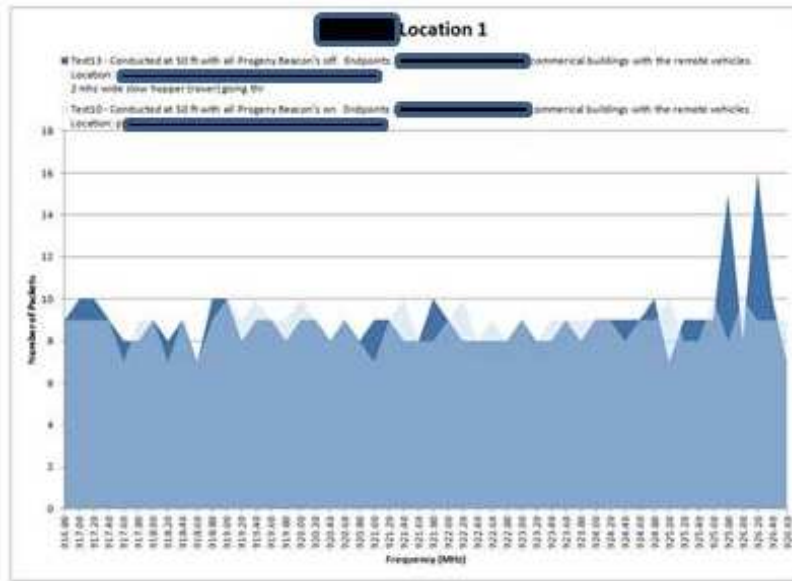
This is the decoded packet count for the endpoints at Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 12 with the Progeny system off. The light blue are the endpoint packets decoded from Test 11 with the Progeny system on.



ERT group EP Loc 2								
Test Number	Mast Height	Net On/Off	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 12	25 ft	Off	215	465	46.2		3	3
Test 11	25 ft	On	163	468	34.8	11.4	3	3

This is the decoded packet count for the endpoints at Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 12 with the Progeny system off. The light blue are the endpoint packets decoded from Test 11 with the Progeny system on.

Test 13 and Test 10 (50 ft. Antenna Ht.)



ERT group EP Loc 1								
Test Number	Mast Height	Net On/Off	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 13	50 ft	Off	447	465	96.1		3	3
Test 10	50 ft	On	438	468	93.6	2.5	3	3

This is the decoded packet count for the endpoints at Location 1. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 13 with the Progeny system off. The light blue are the endpoint packets decoded from Test 10 with the Progeny system on.



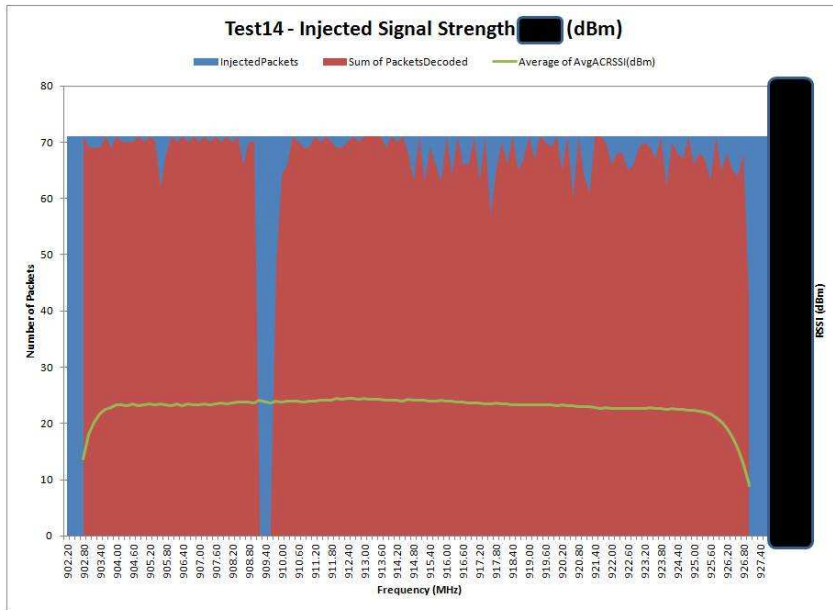
ERT group EP Loc 2								
Test Number	Mast Height	Net On/Off	Pkts Rcvd	Pkts Sent	PSR (%)	PSR Delta (%)	ERTs Rcvd	ERTs Expd
Test 13	50 ft	Off	260	465	55.9		3	3
Test 10	50 ft	On	213	468	45.5	10.4	3	3

This is the decoded packet count for the endpoints at Location 2. The number of packets decoded is on the vertical axis with the frequencies they were decoded on the horizontal axis. The dark blue are the endpoints packets decoded from Test 13 with the Progeny system off. The light blue are the endpoint packets decoded from Test 10 with the Progeny system on.

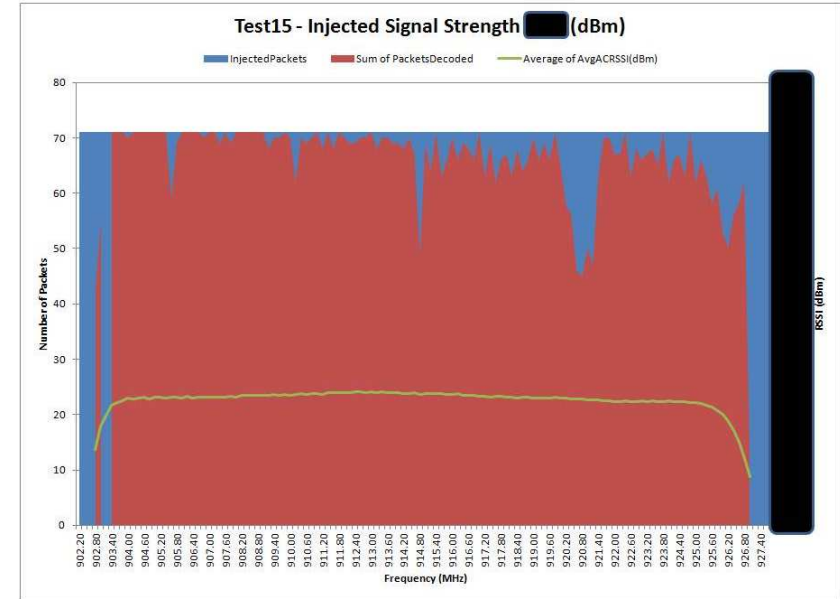
RF/PER Tests Showing Packet Success Rate

Test 14 and Test 15 (11 ft Antenna Ht.)

Packet Error Test Results



Test 14 with the antenna height at 11 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.

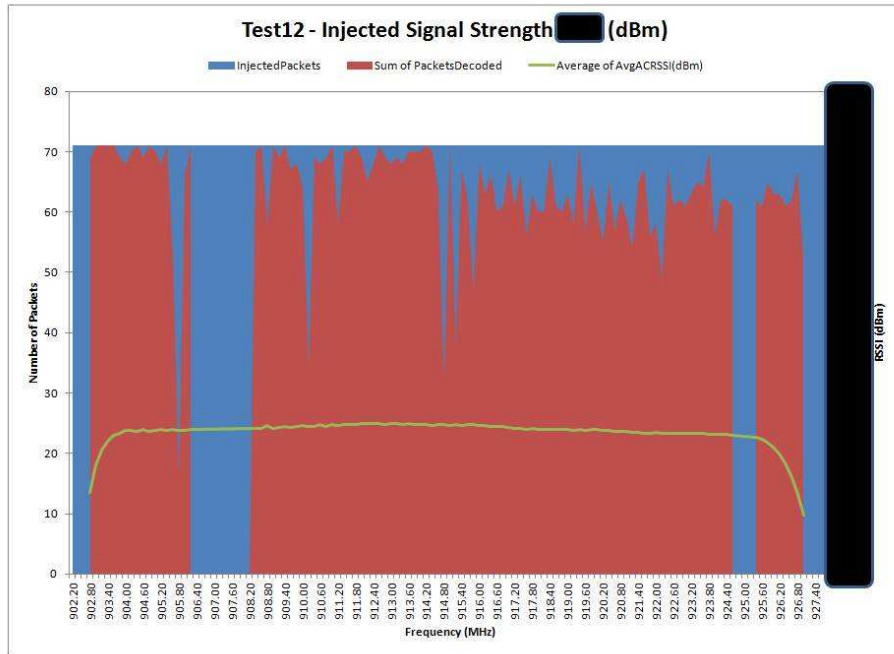


Test 15 with the antenna height at 11 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

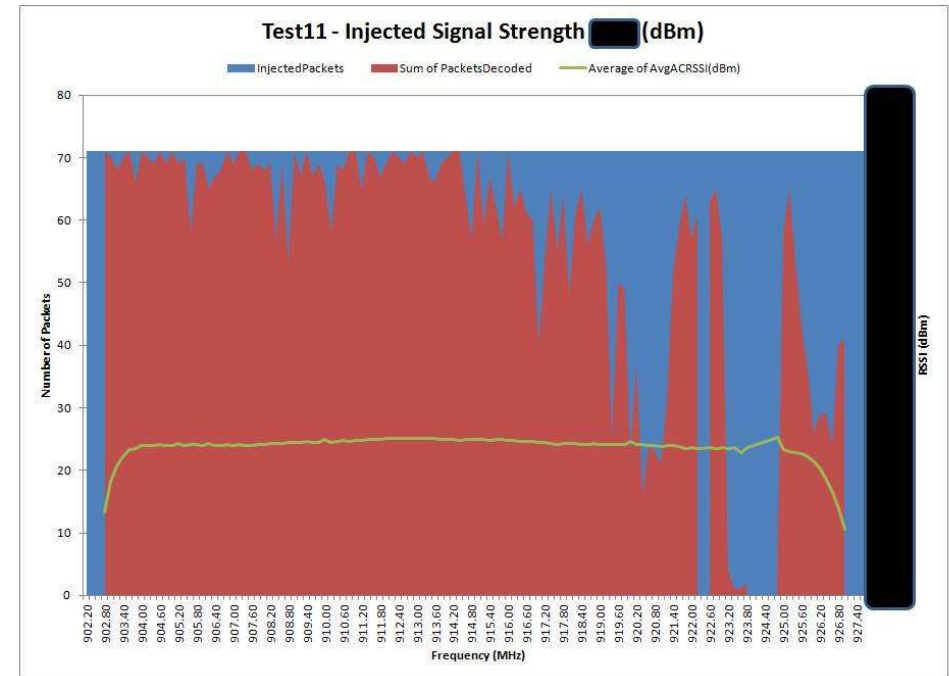
Above on the left depicts the results of a PER test with a very strong interferer at 909.4 Mhz. Itron occasionally experiences intermittent signals similar to these that are only present for brief periods. We have attributed to some of these to operations at military installation or in areas of high technology centers where it is possible to have homemade amplifier that accidentally exceed FCC RF power limits. In almost all cases these are temporary in nature and do not pose a threat to the band. You will see this interferer in different plots below.

Test 12 and Test 11 (25 ft. Antenna Ht.)

Packet Error Test Results



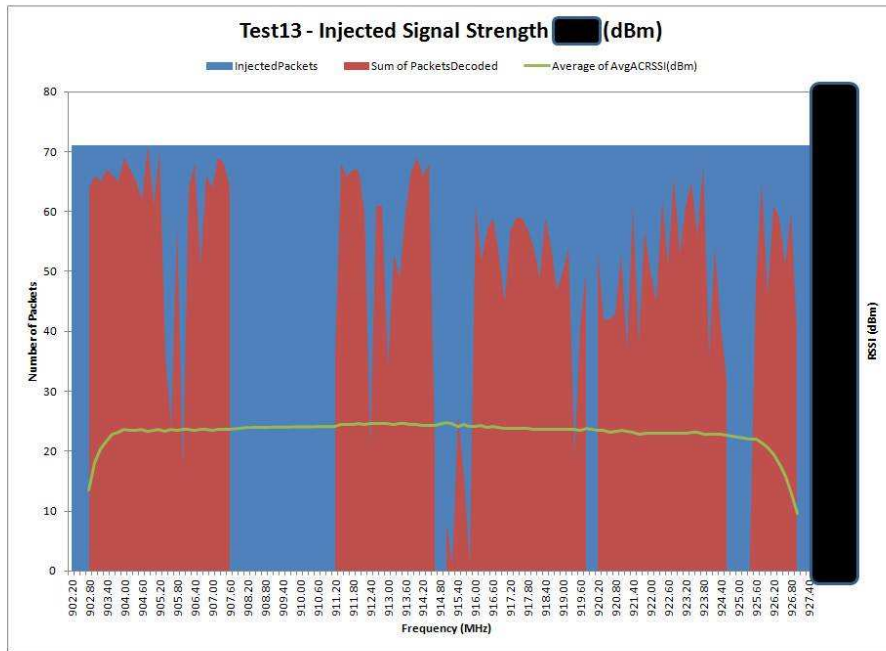
Test 12 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



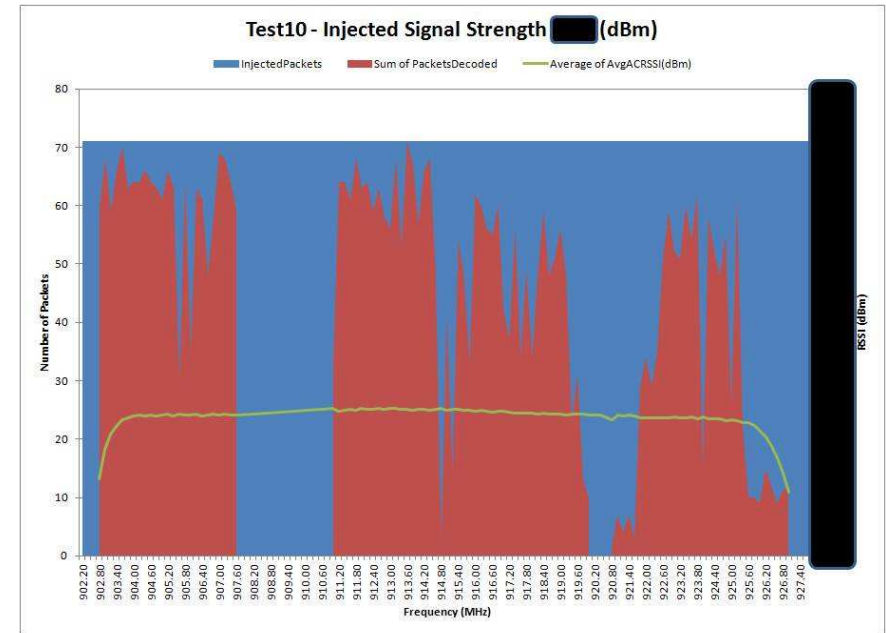
Test 11 with the antenna height at 25 ft. This chart shows the number of packets injected into the system on the vertical axis at [REDACTED] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Test 13 and Test 10 (50 ft. Antenna Ht.)

Packet Error Test Results



Test 13 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system off. Additional injected power levels are available in the attached Excel spreadsheet.



Test 10 with the antenna height at 50 ft. This chart shows the number of packets injected into the system on the vertical axis at [redacted] dBm is in blue with frequencies from 902-928 MHz on the horizontal axis. The number of packets decoded is in red. This is with the Progeny's system on. Additional injected power levels are available in the attached Excel spreadsheet.

Appendix 2 – Equipment Information

FCC Equipment IDs:

CCU and Repeater [REDACTED]
Endpoints [REDACTED]
Endpoints [REDACTED]
Progeny Beacon = A4P-100-0004-05

Appendix 3 – ERT Locations and IDs:

Location 1 Suburban – Test Configuration 1

Endpoints @ Location 1

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50

Endpoints @ Location 2

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50

Endpoints @ Location 3 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Endpoints @ Location 4 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Location 1 Suburban – Test Configuration 2

Endpoints @ Location 1 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Endpoints @ Location 2 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Repeater @ Location 3 ([REDACTED] Location)

Repeater ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	50

Location 2 Suburban – Test Configuration 1

Endpoints @ Location 1 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]xx	[REDACTED]	50
[REDACTED]	[REDACTED]xx	[REDACTED]	50
[REDACTED]	[REDACTED]xx	[REDACTED]	50

Endpoints @ Location 2 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50
[REDACTED]	[REDACTED]	[REDACTED]	50

Endpoints @ Location 3 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]xx	[REDACTED]	100
[REDACTED]	[REDACTED]xx	[REDACTED]	100
[REDACTED]	[REDACTED]xx	[REDACTED]	100
[REDACTED]	[REDACTED]xx	[REDACTED]	100
[REDACTED]	[REDACTED]xx	[REDACTED]	100
[REDACTED]	[REDACTED]xx	[REDACTED]	100
[REDACTED]	[REDACTED]xx	[REDACTED]	100
[REDACTED]	[REDACTED]xx	[REDACTED]	100

Endpoints @ Location 4 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Location 2 Suburban – Test Configuration 2

Endpoints @ Location 1 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Endpoints @ Location 2 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Repeater @ Location 3 ([REDACTED] Location)

Repeater ID	Latitude	Longitude	Channel Plan
66000782	37.238818	-121.794376	50

Location 3 Urban – Test Configuration 1

Endpoints @ Location 1 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Endpoints @ Location 2 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Location 3 Urban – Test Configuration 2

Endpoints @ Location 1 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Endpoints @ Location 2 ([REDACTED] Location)

Endpoint ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100
[REDACTED]	[REDACTED]	[REDACTED]	100

Repeater @ Location 3 (1 [REDACTED] Location)

Repeater ID	Latitude	Longitude	Channel Plan
[REDACTED]	[REDACTED]	[REDACTED]	50

Appendix 4 – Channel Plans

100 Channel Endpoint Plan

Channel	Frequency (MHz)
11	904.20
12	904.40
14	904.80
15	905.00
16	905.20
18	905.60
19	905.80
20	906.00
22	906.40
23	906.60
24	906.80
25	907.00
26	907.20
27	907.40
28	907.60
30	908.00
31	908.20
32	908.40
33	908.60
34	908.80
35	909.00
36	909.20
38	909.60
39	909.80
40	910.00
41	910.20
42	910.40
43	910.60
44	910.80
45	911.00
46	911.20
47	911.40
48	911.60
49	911.80
50	912.00

Channel	Frequency (MHz)
51	912.20
52	912.40
53	912.60
54	912.80
55	913.00
56	913.20
57	913.40
58	913.60
59	913.80
60	914.00
61	914.20
62	914.40
63	914.60
64	914.80
65	915.00
66	915.20
67	915.40
68	915.60
70	916.00
71	916.20
72	916.40
73	916.60
74	916.80
75	917.00
76	917.20
77	917.40
78	917.60
79	917.80
80	918.00
81	918.20
82	918.40
83	918.60
84	918.80
85	919.00
86	919.20

Channel	Frequency (MHz)
87	919.40
88	919.60
89	919.80
90	920.00
91	920.20
92	920.40
93	920.60
94	920.80
95	921.00
96	921.20
97	921.40
98	921.60
99	921.80
100	922.00
102	922.40
103	922.60
105	923.00
106	923.20
107	923.40
108	923.60
111	924.20
112	924.40
113	924.60
114	924.80
115	925.00
116	925.20
117	925.40
119	925.80
120	926.00
121	926.20
123	926.60

50 Channel Repeater Plan

Channel	Frequency
5	903.00
6	903.20
7	903.40
8	903.60
9	903.80
10	904.00
11	904.20
12	904.40
13	904.60
14	904.80
15	905.00
16	905.20
17	905.40
18	905.60
19	905.80
20	906.00
21	906.20
22	906.40
23	906.60
24	906.80
25	907.00
26	907.20
27	907.40
28	907.60
29	907.80
100	922.00
101	922.20
102	922.40
103	922.60
104	922.80
105	923.00
106	923.20
107	923.40
108	923.60
109	923.80
110	924.00
111	924.20
112	924.40

Channel	Frequency
113	924.60
114	924.80
115	925.00
116	925.20
117	925.40
118	925.60
119	925.80
120	926.00
121	926.20
122	926.40
123	926.60
124	926.80

Ittron/Progeny Excel Spreadsheet No. 1

REDACTED – SUBJECT TO REQUEST FOR CONFIDENTIAL TREATMENT

Ittron/Progeny Excel Spreadsheet No. 2

REDACTED – SUBJECT TO REQUEST FOR CONFIDENTIAL TREATMENT

Ittron/Progeny Excel Spreadsheet No. 3

REDACTED – SUBJECT TO REQUEST FOR CONFIDENTIAL TREATMENT

Ittron/Progeny Excel Spreadsheet No. 4

REDACTED – SUBJECT TO REQUEST FOR CONFIDENTIAL TREATMENT

Ittron/Progeny Excel Spreadsheet No. 5

REDACTED – SUBJECT TO REQUEST FOR CONFIDENTIAL TREATMENT

Ittron/Progeny Excel Spreadsheet No. 6

REDACTED – SUBJECT TO REQUEST FOR CONFIDENTIAL TREATMENT